AI Definitions

for Advertisers & Marketers

A compilation of Artificial Intelligence Definitions for anyone seeking clarity in the realm of Artificial Intelligence.

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Introduction

Dear Readers,
Welcome to this compilation of AI Definitions, a curated collection designed to serve as a comprehensive guide for anyone seeking clarity in the realm of Artificial Intelligence.

It is essential to note that the content within this book is not original; instead, it is a consolidation of diverse definitions from authoritative sources, industry experts, and established publications.

All the sources are mentioned in the References section. AI LLMs (Long Language Models) tools have been used extensively in order to effectively research the content.

The purpose of this compilation is to provide you, the reader, with a convenient and accessible resource to better understand the myriad concepts and terminologies that populate the landscape of Artificial Intelligence. AI is a rapidly evolving field, marked by its complexity and continuous expansion. As such, a consolidated reference can be instrumental in demystifying the intricacies of AI, catering to both beginners and seasoned professionals alike.

This compilation is not meant to replace original works or scholarly research but aims to serve as a quick reference, offering succinct definitions to facilitate comprehension. It is our hope that by centralizing these definitions, we can contribute to the broader conversation surrounding AI and empower individuals to engage with this transformative field more confidently.

Wishing you an enlightening journey through the world of AI.

Regards,

How to Use this Guide

The definitions have been written in a thematic sequence.

If the reader wishes to learn more about AI and especially the effect AI has in the advertising and marketing industries, then it would be best to read the content in the sequence it is written.

If the reader wishes to search a specific AI definition then it is best to use the Table of Definitions (Alphabetical order) in order to quickly retrieve the term, you are looking for.

Click on the "References" link so that you can take yourself to the page stating the references for each definition.
When you want to navigate back to the initial definition, **click on the "Definition Title"** in the refence page**.**

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Table of Definitions (Alphabetical)

Images from Bing Images

A. Definitions

1. Artificial Intelligence (AI) - 1 of 2

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines, allowing them to perform tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, understanding natural language, recognizing patterns, and adapting to new situations. In essence, AI aims to create computer systems or machines that can mimic, to some degree, the cognitive functions associated with human intelligence.

AI encompasses a wide range of techniques, approaches, and technologies, including:

- **Machine Learning**: AI systems that can improve their performance on tasks through exposure to data and experience.
- **Deep Learning**: A subset of machine learning that uses neural networks with many layers (deep neural networks) to model complex patterns in data.
- **Natural Language Processing (NLP)**: AI systems that understand, interpret, and generate human language, enabling applications like chatbots and language translation.
- **Computer Vision:** AI systems that can interpret and understand visual information from images and videos, enabling tasks like image recognition and object detection.
- **Robotics:** AI-driven machines and robots that can perform physical tasks and interact with the environment.
- **Expert Systems:** AI systems that use knowledge representation and reasoning to solve complex problems in specific domains.

- **Reinforcement Learning:** AI systems that learn by trial and error, receiving feedback through rewards or penalties, often used in areas like game playing and autonomous control.
- **Autonomous Systems:** AI systems that can operate independently, such as self-driving cars and drones.

Source: Chat GPT

2. Artificial Intelligence (AI) - 2 of 2

Artificial intelligence (AI) essentially refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. Although AI often refers to "artificial intelligence," a more descriptive term for AI could be "augmented intelligence." Augmented intelligence is different from artificial intelligence in that it uses technology to enhance, support and complement human cognitive functions (rather than replacing humans).

References

3. Narrow AI (Weak AI)

Narrow AI, also known as weak AI or artificial narrow intelligence (ANI), is a type of artificial intelligence that is designed to perform a single or limited task. It does not mimic complex thought processes or apply knowledge to other tasks like general AI. It uses algorithms and natural language processing (NLP) to simulate human behavior in machines.

Examples of Narrow AI include spam email filtering, music recommendation services, and even autonomous vehicles. However, there are some concerns about the widespread use of Narrow AI in important infrastructure functions. Some argue that characteristics of Narrow AI make it brittle, and in cases in which

a neural network may be used to control important systems (e.g. power grid, financial trading) alternatives may be more risk averse.

It's important to note that Narrow AI largely relies on humans to put to task. Hence, it is prone to human failings, such as people setting overly ambitious business targets or prioritizing tasks incorrectly. Despite these challenges, Narrow AI has been successfully integrated into various applications, including virtual assistants like Siri and Google Assistant.

The opposite of Narrow AI is Strong AI or Artificial General Intelligence (AGI). Unlike Narrow AI, which is designed to perform a single or limited task, Strong AI or AGI is capable of handling a wide range of tasks. It can think, comprehend, learn, and apply its intelligence to solve complex problems, much like humans. However, it's important to note that as of now, AGI is still a theoretical concept.

Source: Conversation with Bing, 11/19/2023,
References

4. Artificial General Intelligence (AGI) (Strong AI)

Artificial General Intelligence (AGI) is a theoretical form of AI where a machine would have an intelligence equaled to humans. AGI would have the ability to perceive, learn, and carry out intellectual tasks in a range of domains, such as natural language processing, reasoning, planning, and knowledge representation. AGI would also have a self-aware consciousness and the ability to mimic human behavior and thought processes.

AGI is a branch of theoretical artificial intelligence (AI) research working to develop AI with a human level of cognitive function, including the ability to self-teach. However, not all AI researchers believe that it is even possible to develop an AGI system, and the

field is divided on what factors constitute and can accurately measure “intelligence.

In theory, an AGI could carry out any task a human could, and likely many that a human couldn't. At the very least, an AGI would be able to combine human-like, flexible thinking and reasoning with computational advantages, such as near-instant recall and split-second number crunching.

It's important to note that AGI is still (December 2023) a theoretical concept and the timeline for AGI development remains a subject of ongoing debate among researchers and experts. Some argue that it may be possible in years or decades; others maintain it might take a century or longer; and a minority believe it may never be achieved.

Source: Conversation with Bing, 11/19/2023,
References

5. Super AI

Super AI is a term that refers to a hypothetical form of artificial intelligence that is much smarter than the best human minds in almost every field, including scientific, creative, and social abilities. Super AI is also known as artificial superintelligence or superhuman AI. Super AI is not a reality yet (December 2023), but it is a goal of some AI researchers and enthusiasts who believe that it is possible to create machines that can surpass human intelligence and capabilities. Super AI could have cognitive properties such as self-awareness, creativity, emotion, and intuition, and could also understand and interact with the emotions, beliefs, intentions, and expectations of other agents, such as humans and animals. Super AI could find applications in virtually all domains of human interests, be it math, science, arts, sports, medicine, marketing, or even emotional relations. However, super AI also poses potential threats and challenges, such as ethical,

social, and existential risks, that need to be addressed and regulated.

Source: Conversation with Bing, 11/20/2023,
References

6. Generative AI - 1 of 2

Generative artificial intelligence (GenAI) is a type of AI that generates images, text, videos, and other media in response to inputted prompts. It uses neural networks to identify patterns in existing data to generate new content. GenAI can create certain types of images, text, videos, and other media in response to prompts. It is trained on large unlabeled data sets, which require complex math and lots of computing power to create. Some examples of GenAI include ChatGPT and DALL-E2. These programs respond to prompts input by users. Submit a text prompt, and the generator will produce an output, whether it is a story or outline or a painting in a Victorian style.

Source: Conversation with Bing, 10/19/2023
References

7. Generative AI - 2 of 2

Generative AI is AI that is typically built using foundation models and has capabilities that earlier AI did not have, such as the ability to generate content. Foundation models can also be used for nongenerative purposes (for example, classifying user sentiment as negative or positive based on call transcripts) while offering significant improvement over earlier models.

References

8. Predictive AI

Predictive AI is a term that refers to the use of artificial intelligence (AI) to make predictions about future events or outcomes based on historical data and statistical models. Predictive AI can help businesses and organizations optimize their processes, anticipate customer needs, detect anomalies, and forecast trends. Some examples of predictive AI applications are:

- **Weather forecasting**: Predictive AI can analyze data from satellites, radars, sensors, and other sources to predict the weather conditions for a specific location and time. Predictive AI can also help with disaster management, climate change research, and renewable energy production.
- **Fraud detection**: Predictive AI can help banks and financial institutions detect fraudulent transactions and prevent losses. Predictive AI can use machine learning techniques to learn the patterns of normal and abnormal behavior from historical data and flag any suspicious activities.
- **Customer segmentation**: Predictive AI can help e-commerce and marketing businesses group their customers into similar clusters based on their attributes and preferences. Predictive AI can use clustering algorithms to find the optimal way to divide the customer base and tailor the products and services accordingly.
- **Predictive maintenance**: Predictive AI can help industries and manufacturers monitor the condition and performance of their equipment and machinery. Predictive AI can use time series models to forecast when a component might fail or need replacement and schedule maintenance accordingly.

Source: Conversation with Bing, 21/11/2023
References

9. Conversational AI

Conversational AI is a type of artificial intelligence (AI) that can simulate human conversation. It is made possible by natural language processing (NLP), a field of AI that allows computers to understand and process human language. Conversational AI systems are trained on large amounts of data, such as text and speech, to teach the system how to interact with humans in a natural way. The system is constantly learning from its interactions and improving its response quality over time.

Conversational AI can be used in various applications such as chatbots, virtual assistants, and generative AI agents. Chatbots are often used in customer service applications to answer questions and provide support. Virtual assistants are often voice-activated and can be used on mobile devices and smart speakers. Generative AI agents use generative AI to power text or voice conversations.

Conversational AI has several benefits such as reducing costs, increasing productivity and operational efficiency through automation, delivering better customer experience, achieving higher customer engagement and satisfaction, and providing a more personalized and engaging experience by remembering customer preferences and helping customers 24/7 when no human agents are around.

Source: Conversation with Bing, 23/10/2023
References

10. Emotion AI

Emotion AI or affective computing is a subset of artificial intelligence (AI) that measures, understands, simulates, and reacts to human emotions. It is also known as artificial emotional intelligence.

Machines can analyze large amounts of data, such as voice inflections and facial expressions, to recognize when those inflections correlate with stress or anger. For example, natural language processing tools can be used to analyze social media posts and infer how happy or sad a person is feeling at any given time. Over time, this algorithm can even produce a video out of a person's emotional ups and downs.

Source: Conversation with Bing, 21/10/2023
References

11. Visual AI

Visual Artificial Intelligence, is a branch of artificial intelligence that focuses on the analysis and interpretation of visual data, such as images and videos. It involves the use of machine learning algorithms and deep learning neural networks to identify patterns, classify objects, and extract meaning from visual information.

Visual AI trains machines to make sense of images and visual data the same way people do. With the help of Visual AI, machines don't just see – they are also able to understand and perceive the meaning behind images in accordance with how the algorithm is trained. For example, they may be able to categorize objects within an image and understand if each object is a table, a chair, or a lamp, just as a person would, by comparing them to images they have previously "seen".

Visual AI is the technology behind other features like QR code scanning, facial recognition, and visual search. It's being used in a wide range of applications including healthcare, security, sports and entertainment, manufacturing, automotive, retail and more.

Source: Conversation with Bing, 10/31/2023
References

12. Adaptive AI (Real-Time Adaptability in AI)

Real-Time Adaptability in AI, often referred to as Adaptive AI, is a concept where AI systems are designed to make faster decisions while remaining flexible to adjust as issues arise. These systems aim to continuously learn based on new data at runtime to adapt more quickly to changes in real-world circumstances.

Adaptive AI has the ability to adjust its code for real-world changes, even when the coders didn't know or anticipate these changes when they wrote the code. It can modify its behavior based on its experiences. This enables AI to deliver better outcomes faster.

Key characteristics of adaptive AI systems include:

- **Ability to Learn**: Machine learning algorithms allow the technology to process and analyze new information. As a result, adaptive AI can acquire knowledge, identify patterns, and make predictions.
- **Adaptability**: Adaptive AI systems adjust their algorithms and decision-making processes when they encounter changes in input data or the context in which they operate. This flexibility makes them practical and relevant even in dynamic and unpredictable situations.
- **Self-Improvement**: Systems improve their capabilities over time by analyzing their own performance, identifying weak or inefficient areas, and refining their algorithms in response.

Source: Conversation with Bing, 11/2/2023
References

13. Trustworthy AI

Trustworthy AI is a term that refers to the development and deployment of artificial intelligence systems that are ethical, reliable, and aligned with the values and interests of the society they serve. Trustworthy AI systems should adhere to certain

principles and standards that ensure they are transparent, explainable, fair, impartial, robust, reliable, respectful of privacy, safe, secure, responsible, and accountable.

Trustworthy AI also requires governance and regulatory compliance throughout the AI lifecycle, from ideation to design, development, deployment, and operation. Trustworthy AI is a goal of many AI researchers, practitioners, policymakers, and stakeholders who want to ensure that AI can be trusted by humans and can benefit humanity without causing harm or injustice.

Source: Conversation with Bing, 11/20/2023
References

14. Explainable AI

Explainable AI is a term that refers to the development and deployment of artificial intelligence systems that are ethical, reliable, and aligned with the values and interests of the society they serve. Explainable AI systems should adhere to certain principles and standards that ensure they are transparent, explainable, fair, impartial, robust, reliable, respectful of privacy, safe, secure, responsible, and accountable.

Explainable AI systems should also allow human users to comprehend and trust the results and output created by machine learning algorithms, and to understand how and why the algorithms arrived at a specific decision or prediction.

Explainable AI is important for debugging and improving model performance, meeting regulatory and ethical requirements, fostering end-user trust and confidence, and enabling human-AI collaboration. Explainable AI can be achieved by using various methods and techniques, such as feature attributions, example-based explanations, model analysis, and interactive visualization tools.

Source: Conversation with Bing, 11/20/2023
References

15. Safe AI

Safe AI is a term that refers to the development and deployment of artificial intelligence systems that operate reliably and are designed to minimize potential harm to individuals, society, and the environment. The importance of safe AI can be understood in the following ways:

- **Human safety**: AI systems must prioritize human safety above all else, and the potential risk to human life and well-being must be minimized. For example, autonomous vehicles must avoid collisions and injuries, and medical AI systems must ensure accurate diagnosis and treatment.
- **Societal safety**: AI systems must respect the values, norms, and laws of the society they serve, and avoid causing negative impacts on social cohesion, justice, and democracy. For example, AI systems must prevent bias, discrimination, and manipulation, and protect privacy, security, and accountability.
- **Environmental safety**: AI systems must consider the ecological consequences of their actions, and avoid causing damage or depletion to the natural resources and ecosystems. For example, AI systems must reduce energy consumption, carbon emissions, and waste generation, and promote sustainability and conservation.

Source: Conversation with Bing, 11/20/2023
References

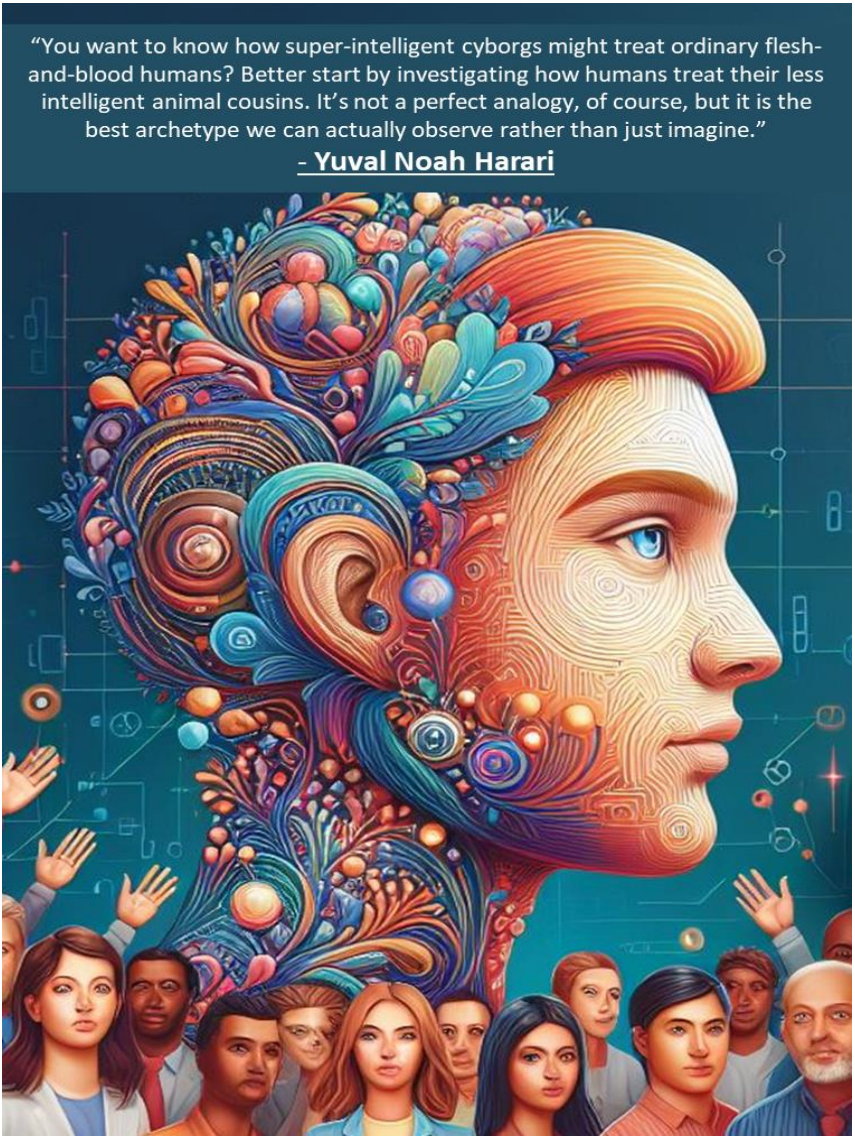
16. Human-Aware AI

Human-Aware AI is a term that refers to the development and deployment of artificial intelligence systems that are aware of and

adapt to the cognitive possibilities and limitations of the human users, collaborators, or partners. Human-Aware AI aims to achieve fluent and intuitive coordination between the AI system and the human agents, by understanding and reacting to their emotions, beliefs, intentions, expectations, and behaviors.

Human-Aware AI also considers the ethical, social, and legal implications of its actions and decisions, and respects the values, norms, and laws of the society it serves. Human-Aware AI is a goal of many AI researchers and practitioners who want to ensure that AI can work effectively and harmoniously with people, and can benefit humanity without causing harm or injustice.

Source: Conversation with Bing, 11/20/2023
References



Images from Bing Images

17. Machine learning (ML) - 1 of 3

Machine Learning (ML) is a subfield of artificial intelligence (AI) that focuses on the development of algorithms and statistical models that enable computer systems to improve their performance on a specific task through learning from data, without being explicitly programmed. In essence, machine learning algorithms allow computers to recognize patterns, make predictions, and learn from experience.

The key components of machine learning include:

- **Data**: Machine learning systems rely on large amounts of data to learn from. This data can include text, numbers, images, or any other type of information relevant to the task at hand.
- **Algorithms**: Machine learning algorithms are the mathematical models and rules that process the data, identify patterns, and make predictions or decisions. These algorithms can be divided into various categories, including *supervised learning*, *unsupervised learning*, and *reinforcement learning*.
- **Training**: In the training phase, a machine learning model is exposed to a dataset that contains both input data and the correct output (in the case of supervised learning) or just input data (in the case of unsupervised learning). The model uses this data to learn the relationships and patterns.
- **Testing and Inference**: After training, the model is tested on new, unseen data to assess its performance. Once it's considered accurate and reliable, it can be used for making predictions or decisions on new, previously unseen data.

Machine learning is applied in a wide range of applications, including image and speech recognition, natural language processing, recommendation systems, autonomous vehicles, healthcare diagnostics, financial forecasting, and much more. It plays a pivotal role in automating tasks that would be challenging or impossible to program using conventional programming

techniques due to their complexity or the vast amount of data involved.

Source: Chat GPT

18. Machine learning (ML) - 2 of 3

Machine learning in advertising is a process in which technology takes information, analyzes it, and ultimately formulates a conclusion that can improve a task or a process. The insights derived from this technology can be applied to audience targeting, personalization, media buying, and more.

References

19. Machine learning (ML) - 3 of 3

Machine learning (ML) is a subset of AI in which a model gains capability after it is trained on, or shown, many example data points. Machine learning algorithms detect patterns and learn how to make predictions and recommendations by processing data and experiences, rather than by receiving explicit programming instruction. The algorithms also adapt and can become more effective in response to new data and experiences.

References

20. Deep learning

Deep learning is a subset of machine learning that involves neural networks with three or more layers. These neural networks simulate the behavior of the human brain, allowing them to “learn” from large amounts of data.

Deep learning algorithms can ingest and process unstructured data, like text and images, and automate feature extraction, removing some of the dependency on human experts. They are capable of different types of learning, which are usually categorized as *supervised learning*, *unsupervised learning*, and *reinforcement learning*. Deep learning drives many artificial intelligence (AI) applications and services that improve automation, performing analytical and physical tasks without human intervention.

Source: Conversation with Bing, 16/10/2023
References

21. Natural language processing (NLP)

Natural language processing (NLP) refers to the branch of computer science -and more specifically, the branch of artificial intelligence or AI- concerned with giving computers the ability to understand text and spoken words in much the same way human beings can.

NLP combines computational linguistics -rule-based modeling of human language- with statistical, machine learning, and deep learning models. Together, these technologies enable computers to process human language in the form of text or voice data and to "understand" its full meaning, complete with the speaker or writer's intent and sentiment.

Natural language processing is the driving force behind machine intelligence in many modern real-world applications. Examples of NLP include Spam detection, Machine translation, Virtual agents and chatbots, Social media sentiment analysis, Text summarization.

References

22. Generative Adversarial Network (GAN)

A Generative Adversarial Network (GAN) is a deep learning framework that consists of two neural networks: a generator and a discriminator.

The generator is trained to produce synthetic data, such as images, text, or audio. It learns to produce realistic fake data from a random seed. The fake examples produced by the generator are used as negative examples for training the discriminator.

The discriminator is a binary classifier that learns to distinguish the fake data from realistic data. It tries to distinguish between the synthetic data and real data from a training set. If the generator produces implausible results, the discriminator penalizes the generator.

The two networks compete against each other in a zero-sum game framework. Over time, the generator's output becomes more realistic and it gets better at fooling the discriminator. Eventually, the generator's outputs are so realistic that the discriminator is unable to distinguish them from the real examples.

A GAN trained on photographs can generate new photographs that look at least superficially authentic to human observers, having many realistic characteristics. They are used widely in image generation, video generation and voice generation.

Source: Conversation with Bing, 11/2/2023
References

23. Foundation models (FM)

Foundation models (FM) are deep learning models trained on vast quantities of unstructured, unlabeled data that can be used for a wide range of tasks out of the box or adapted to specific tasks

through fine-tuning. Examples of these models are GPT-4, PaLM, DALL·E 2, and Stable Diffusion.

References

24. Self-attention

Self-attention, sometimes called intra-attention, is a mechanism that aims to mimic cognitive attention, relating different positions of a single sequence to compute a representation of the sequence.

Structured data are tabular data (for example, organized in tables, databases, or spreadsheets) that can be used to train some machine learning models effectively.

Transformers are a relatively new neural network architecture that relies on self-attention mechanisms to transform a sequence of inputs into a sequence of outputs while focusing its attention on important parts of the context around the inputs. Transformers do not rely on convolutions or recurrent neural networks.

References

25. Unstructured data

Unstructured data lack a consistent format or structure (for example, text, images, and audio files) and typically require more advanced techniques to extract insights.

References

26. Generative AI agents

Generative AI agents are advanced AI systems that use machine learning and natural language processing to create new content,

such as text, images, code, or other types of content, often in response to a prompt entered by a user. They are designed to interact with humans in a natural way and can mimic human behavior. Generative AI agents are capable of understanding specific goals or tasks, creating task sequences to achieve defined goals, performing these tasks based on priorities, and learning from intermediate actions until the goal is fulfilled.

Generative AI agents have several applications such as creating chatbots, virtual assistants, and other generative AI agents. Generative AI agents can be used to create text or voice conversations. They can also be used to generate content for social media posts, news articles, and other types of content.

Generative AI agents have several benefits such as reducing costs, increasing productivity and operational efficiency through automation, delivering better customer experience, achieving higher customer engagement and satisfaction, and providing a more personalized and engaging experience by remembering customer preferences and helping customers 24/7 when no human agents are around.

Source: Conversation with Bing, 23/10/2023
References

27. LLM - Large Language Model

LLM stands for large language model and is a type of artificial intelligence system that works with language. LLMs use deep learning techniques, especially neural networks, to process and learn from huge amounts of text data. LLMs can perform various tasks related to natural language processing, such as text generation, summarization, translation, question answering, and more. LLMs are also called foundation models or generative AI models. Some examples of LLMs are Chat GPT, BERT, LaMDA, and PaLM.

Source: Conversation with Bing, 10/30/2023
References

28. Artificial Intelligence (AI) algorithms - 1 of 2

Artificial Intelligence (AI) algorithms are a set of instructions that enable computers to learn and make decisions independently of human intervention. AI algorithms are more complex than general algorithms and are developed with different goals and methods. They work by taking in training data that helps the algorithm to learn, and then they complete their tasks using the training data as a basis.

There are three major categories of AI algorithms: Supervised Learning, Unsupervised Learning, and Reinforcement Learning.

- **Supervised learning** is a type of machine learning where the algorithm is trained on labeled data. The algorithm learns to recognize patterns in the data and can then apply those patterns to new, unlabeled data.
- **Unsupervised learning** is a type of machine learning where the algorithm is trained on unlabeled data. The algorithm learns to recognize patterns in the data without any prior knowledge of what those patterns might be.
- **Reinforcement learning** is a type of machine learning where the algorithm learns by interacting with its environment. The algorithm receives feedback in the form of rewards or punishments for certain actions, and it learns to take actions that maximize its rewards over time.

AI algorithms are used in various applications such as facial recognition, search engines, social media algorithms, and more. They help businesses track their advertising campaigns performance by measuring metrics such as conversion rate, cost per acquisition (CPA), customer acquisition cost (CAC), click-

through rate (CTR), bounce rate, website sessions, pages per session, and return on ad spend (ROAS).

Source: Conversation with Bing, 21/10/2023
References

29. Artificial Intelligence (AI) algorithms - 2 of 2

Some of the main AI algorithms used to recognize patterns & correlations are:

Supervised Learning Algorithms:
- **Linear Regression**: Used for modeling the relationship between a dependent variable and one or more independent variables.
- **Logistic Regression**: Suitable for binary classification tasks, such as spam detection or customer churn prediction.
- **Decision Trees**: Useful for both classification and regression tasks, they create a tree-like model of decisions and their possible consequences.
- **Random Forest**: An ensemble method that builds multiple decision trees to improve accuracy and reduce overfitting.
- **Support Vector Machines (SVM)**: Effective for classification and regression tasks, SVMs find the optimal hyperplane that best separates data points.

Unsupervised Learning Algorithms:
- **K-Means Clustering**: Segments data into clusters based on similarity, often used for customer segmentation.
- **Hierarchical Clustering**: Groups data into a tree-like structure, revealing hierarchical relationships in the data.
- **Principal Component Analysis (PCA)**: Reduces the dimensionality of data while preserving its variance, helpful for feature selection and data compression.
- **Association Rule Mining**: Identifies relationships or associations in data, often used in market basket analysis.

- **Anomaly Detection**: Identifies outliers or anomalies in data, valuable for fraud detection and quality control.

Neural Networks and Deep Learning:
- **Feedforward Neural Networks**: Traditional neural networks with input, hidden, and output layers.
- **Convolutional Neural Networks (CNNs)**: Designed for image and spatial data, they automatically learn hierarchical features.
- **Recurrent Neural Networks (RNNs)**: Suitable for sequential data, such as time series and natural language, due to their memory of previous inputs.
- **Long Short-Term Memory (LSTM) Networks**: A specialized RNN architecture designed to capture long-range dependencies in sequential data.
- **Gated Recurrent Unit (GRU) Networks**: Similar to LSTMs but with simplified architecture for faster training.
- **Transformer Networks**: Especially well-suited for natural language processing tasks, including the popular BERT model.

Ensemble Learning Algorithms:
- **Gradient Boosting Machines (GBM)**: A boosting technique that combines multiple weak learners to create a strong learner.
- **AdaBoost**: A boosting algorithm that assigns weights to data points and focuses on the difficult-to-classify examples.
- **XGBoost, LightGBM, and CatBoost**: Variations of gradient boosting that improve training speed and performance.

Reinforcement Learning Algorithms:
- **Q-Learning**: A popular algorithm used in reinforcement learning that seeks to maximize rewards through action selection.
- **Deep Q-Networks (DQN):** Combines Q-learning with deep neural networks, enabling it to handle complex tasks and large state spaces.
- **Policy Gradient Methods**: Directly optimize the policy followed by an agent in a given environment.

These algorithms are the building blocks of AI systems that excel at pattern recognition, whether it's detecting fraud, making product recommendations, segmenting customers, or any other task where finding intricate patterns and correlations in data is essential.

Source: Chat GPT

30. Algorithm bias

Algorithm bias, in the context of artificial intelligence and machine learning, refers to a systematic and unfair discrimination or favoritism exhibited by an algorithm when making decisions or predictions. This bias can result in unjust and discriminatory outcomes for specific individuals or groups based on their characteristics, such as race, gender, age, socioeconomic status, or other protected attributes. Algorithm bias is typically an unintended consequence of the algorithm's training data, design, or implementation, and it can have significant ethical, legal, and social implications. Efforts to detect and mitigate algorithm bias are essential to ensure the fairness and equity of AI systems.

Source: Chat GPT

31. The hallucination problem in AI

The hallucination problem in AI refers to the generation of outputs that may sound plausible but are either factually incorrect or unrelated to the given context. These outputs often emerge from the AI model's inherent biases, lack of real-world understanding, or training data limitations. For example, machine learning systems used in self-driving cars can be tricked into seeing objects that don't exist. Researchers are exploring several approaches to mitigate this risk, including developing defenses against

adversarial attacks. However, it is still a challenge to protect deep neural networks from sabotage by hallucination.

Source: Conversation with Bing, 10/19/2023
References

32. Prompt engineering - 1 of 2

Prompt engineering refers to the process of designing, refining, and optimizing input prompts to guide a generative AI model toward producing desired (that is, accurate) outputs.

References

33. Prompt engineering - 2 of 2

Prompt engineering is a technique in the field of AI that involves crafting specific instructions or queries to guide an AI system in generating responses or creative content. It is the process of creating effective prompts that enable AI models to generate responses based on given inputs. Prompt engineering enables direct interaction with the Language Model (LM) using only plain language prompts.

Prompt engineering is critical in the world of AI as it allows models to generate more accurate and relevant outputs. By creating precise and comprehensive prompts, engineers can train AI models to better understand the task they are performing and generate responses that are more useful to humans.

Prompt engineering for creative work is a relatively new field that has emerged with the development of generative AI systems. These systems are capable of creating fresh data from existing ones, and can be trained to produce high-quality content based on given inputs or “prompts”.

There are several types of prompts that can be used in prompt engineering:

- **Direct prompting (Zero-shot)** also known as Zero-shot, is the simplest type of prompt. It provides no examples to the model, just the instruction. You can also phrase the instruction as a question, or give the model a "role".
- **Prompting with examples** (One-, few-, and multi-shot), involves providing specific, varied examples to help the model narrow its focus and generate more accurate results.
- **Chain-of-thought prompting** involves breaking down complex tasks into a sequence of simpler prompts.
- **Zero-shot CoT** is a combination of zero-shot and chain-of-thought prompting.

Source: Conversation with Bing, 12/11/2023
References

34. AI virtual assistant

An AI virtual assistant is a type of conversational AI that uses natural language processing (NLP) and generative AI to automate responses to user inputs. It is designed to assist people or automate tasks by understanding human speech and deducing meaning, irrespective of how the instruction has been provided. AI virtual assistants are built on a robust AI technology foundation that allows them to fulfill human requests with ease. Some of the components include:

- **Automatic Speech Recognition**: This software converts human audio into a text transcription that is understandable by the AI virtual assistant.
- **Natural Language Understanding**: These capabilities allow the virtual assistant to understand commands and deduce meaning, irrespective of how the instruction has been provided.

- **Dialog Manager**: Keep track of the context and the conversation and provide a suitable response back to the user using a text-to-speech converter.

AI virtual assistants have come a long way; today, they have opened up several possibilities within the enterprise landscape. They can assist in daily activities such as scheduling meetings, organizing work, following up with peers, and automating mundane everyday tasks. They can also enable employees to move away from repetitive tasks and focus on more interesting, strategic, and impactful tasks.

AI virtual assistants are different from chatbots in several ways. Chatbots are automated AI programs used to interact with humans, while AI virtual assistants are digital AI agents that assist humans in performing day-to-day tasks. Chatbots can be programmed only for a handful of repetitive tasks, while AI virtual assistants can be programmed for a wide range of different tasks. Chatbots are typically text-based, while AI virtual assistants are speech-based. Chatbots lack understanding of human emotions, while AI virtual assistants can understand human emotions as well as the intent behind user command. Chatbots cannot remember the context of conversations, while AI virtual assistants can have dynamic, enriched conversations with humans.

AI virtual assistants have several benefits such as reducing costs, increasing productivity and operational efficiency through automation, delivering better customer experience, achieving higher customer engagement and satisfaction, and providing a more personalized and engaging experience by remembering customer preferences and helping customers 24/7 when no human agents are around.

Source: Conversation with Bing, 23/10/2023
References

35. Chatbot

A chatbot is a computer program that simulates conversation with human users, especially over the internet. It uses natural language processing (NLP) and generative AI to automate responses to user inputs. Chatbots are frequently used by organizations to provide 24-hour customer relationship management (CRM) services. They can be voice-activated and used on mobile devices and smart speakers. Chatbots can make it easy for users to find information by instantaneously responding to questions and requests -through text input, audio input, or both- without the need for human intervention or manual research.

Chatbots have several benefits such as reducing costs, increasing productivity and operational efficiency through automation, delivering better customer experience, achieving higher customer engagement and satisfaction, and providing a more personalized and engaging experience by remembering customer preferences and helping customers 24/7 when no human agents are around.

Source: Conversation with Bing, 23/10/2023
References

36. Multimodal Chatbot

A multimodal chatbot is a communication agent that works with multiple modalities, such as text, voice, face, and body. It is designed for interaction with multiple users at a time and can perform tasks such as face detection, emotion classification, tracking of crowd movement through mobile phones, and real-time conversation to guide users through a nonlinear story and interactive games.

Multimodal AI, which these chatbots are based on, is a type of artificial intelligence (AI) that can process, understand and/or generate outputs for more than one type of data. Examples of data

modalities include text, images, audio, and video. Most AI systems today are unimodal, meaning they are designed and built to work with one type of data exclusively. In contrast, multimodal architectures that can integrate and process multiple modalities simultaneously have the potential to produce more than one type of output.

For instance, a multimodal chatbot could utilize GUIs in dialogue, improving accuracy and user satisfaction, and reducing time to task completion. They can also process different kinds of input, including images and sounds, making them more versatile and powerful than traditional chatbots. A great multimodal experience is one that feels seamless, easily switching out contexts.

Source: *Conversation with Bing*, 11/18/2023
References

37. Unimodal Chatbots

Unimodal chatbots are a type of artificial intelligence (AI) system that are designed and built to work with one type of data exclusively. They use algorithms tailored for that modality. For example, a unimodal AI system like ChatGPT uses natural language processing (NLP) algorithms to understand and extract meaning from text content, and the only type of output the chatbot can produce is text.

While most chatbots are unimodal, there are some that can render multimodal outputs in the form of text, audio, and video. However, unimodal chatbots can serve the required purposes as well and are comparably cost-effective.

These chatbots are often used in messaging apps and are automated programs that interact with customers like a human would. They can operate in one of two ways -either via machine learning or with set guidelines. However, due to advancements in

AI technology, chatbots using set guidelines are becoming a historical footnote.

Source: Conversation with Bing, 11/18/2023
References

38. Omnichannel Chatbot

An omnichannel chatbot is an AI-enabled chatbot that provides customers with an integrated buying and customer support experience across all channels. The term “omni-channel” refers to the ability of the chatbot to seamlessly switch between these channels while maintaining context and continuity in the conversation. This means that an omni-channel chatbot allows customers to start a conversation on one channel and continue it on another without having to repeat information.

An omnichannel messaging platform can integrate with native SMS apps and messaging channels like Facebook Messenger, WhatsApp, Apple Business Chat, and Google’s Business Messages. These chatbots are becoming increasingly important in today's business landscape for several reasons. Firstly, customers expect businesses to be available 24/7, and chatbots provide an efficient and cost-effective way to provide this level of service. Secondly, chatbots can improve customer experience by providing personalized and context-aware interactions. Thirdly, by automating routine inquiries and tasks, chatbots can free up human agents to focus on more complex issues and provide better quality service. Finally, omni-channel chatbots can provide valuable insights into customer behavior and preferences, which can be used to improve products, services, and marketing strategies.

Source: Conversation with Bing, 11/18/2023
References

39. Graphics processing units (GPUs)

Graphics processing units (GPUs) are computer chips that were originally developed for producing computer graphics (such as for video games) and are also useful for deep learning applications. In contrast, traditional machine learning and other analyses usually run on central processing units (CPUs), normally referred to as a computer's "processor". Large language models (LLMs) make up a class of foundation models that can process massive amounts of unstructured text and learn the relationships between words or portions of words, known as tokens. This enables LLMs to generate natural-language text, performing tasks such as summarization or knowledge extraction. GPT-4 (which underlies ChatGPT) and LaMDA (the model behind Bard) are examples of LLMs.

References

40. Facial analysis

Facial analysis is a subset of artificial intelligence (AI) that uses machine learning algorithms to analyze human faces and determine attributes such as age, gender, facial expressions, level of engagement, and even disease diagnosis.

Facial analysis works by comparing the relationships between points superimposed on someone's face. If the distances between selected points coincide with the range of a predefined, labeled attribute, the system identifies the face as having that attribute. For example, if the distance between groups of points outlining the top and bottom lips grows while the points at the corners of the mouth rise, the system may identify that facial expression as a smile.

Facial analysis algorithms can detect and classify a wide range of facial expressions such as happiness, sadness, anger, surprise, disgust, and fear. These algorithms use computer vision

techniques to detect key features on the face and analyze them using deep learning algorithms to classify facial expressions.

Source: Conversation with Bing, 21/10/2023
References

41. Computer vision

Computer vision is a field of artificial intelligence (AI) that enables computers and systems to derive meaningful information from digital images, videos, and other visual inputs. It is a subset of AI that focuses on building and using digital systems to process, analyze, and interpret visual data.

Computer vision works by using machine learning algorithms to analyze human faces and determine attributes such as age, gender, facial expressions, level of engagement, and even disease diagnosis. It also uses computer vision techniques to detect key features on the face and analyze them using deep learning algorithms to classify facial expressions.

Computer vision is used in various industries such as energy and utilities, manufacturing, automotive, and healthcare.

Source: Conversation with Bing, 22/10/2023
References

42. GDPR

The General Data Protection Regulation (GDPR) is the toughest privacy and security law in the world. Though it was drafted and passed by the European Union (EU), it imposes obligations onto organizations anywhere, so long as they target or collect data related to people in the EU. The regulation was put into effect on May 25, 2018. The GDPR will levy harsh fines against those who

violate its privacy and security standards, with penalties reaching into the tens of millions of euros.

References

43. Personalized advertising

Personalized advertising, formerly known as interest-based advertising, uses customer insights to increase the relevancy of an ad. Increasing in popularity over recent years, personalized advertising can be a powerful tool to improve the relevance of an ad for users while increasing ROI for advertisers. Ad personalization can provide a better user experience and help brands connect with their target audience.

Insights leveraged for personalized campaigns include a wide range of indicators related to human wants and needs, geolocation, and basic demographic information. This data can also be hyper-specific to your target audience, such as a niche interest or buying intent.

References

44. Cognitive advertising

Cognitive advertising is a form of marketing that relies on AI and consumer behavior to create a personalized relationship with the customer that can increase engagement and ROI. Through a series of interactions with an advertisement, aided by AI and deep learning capabilities, cognitive ad technology can better learn a consumer's unique preferences and help ensure any brand interactions they're having are positive ones. The outcome of these positive engagements with your target audience is that it makes consumers more likely to come back and turn these interactions into actual conversions that drive ROI.

References

45. Contextual advertising

Contextual advertising uses various factors to determine which content is most relevant to users when placing an ad. It targets potential customers by relying on context such as the content of a webpage, location or weather. Machine learning can apply data science to targeting and take these pieces of information to deliver the right ad to the right users. For example, if a user is reading an article about wedding planning, the user might see an ad for wedding dresses on the page.

While advertisers have traditionally practiced behavioral targeting, that is, using a potential customer's data surrounding their browsing and shopping habits, rising concerns about privacy have led advertisers to find alternative options. Advertisers no longer must rely on cookies or behavioral signals to deliver relevant ads. By using insights surrounding the context of the ad, companies can still create messaging that resonates with audiences.

References

46. First-party cookie

A *first-party cookie* is a small data packet that your web browser generates and exchanges with a dedicated web server. It is directly stored by the website (or domain) you visit. These cookies allow website owners to collect analytics data, remember language settings, and perform other useful functions that provide a good user experience. The domain host can see the data that the cookie retrieves. First-party cookies can't usually be used to track a user's activity on another site other than the original website it was placed on. These types of cookies include things

such as your sign-on credentials, items you put in the shopping cart, or your preferred language.

First-party cookies are set by the publisher's web server or any JavaScript loaded in the website. An example of a first-party cookie is when a user signs into an eCommerce website, like Amazon. The web browser will send a request in a process that provides the highest level of trust that the user is directly interacting with Amazon. The web browser saves this data file to the user's computer, under the "amazon.com" domain. If first-party cookies were blocked, a user would have to sign in every time they visited, and they wouldn't be able to purchase multiple items while shopping online because the cart would reset after every item that was added.

It's important to note that first-party cookies are different from third-party cookies which track users across multiple domains.

Source: Conversation with Bing, 17/10/2023
References

47. Second-party cookie

The term *second-party cookie* is not commonly used in the industry. It is not a cookie type, but rather a data-sharing agreement between two parties. Second-party data is collected by one company and shared with another company for mutual benefit. For example, a company that sells pet food might partner with a pet store to share data about their customers. The pet store can use this data to improve their marketing campaigns, while the pet food company can use it to better understand their target audience.

Source: Conversation with Bing, 17/10/2023
References

48. Third-party cookie (3PC)

A *third-party cookie* is a small data packet that is created by a domain other than the one you are currently visiting. These cookies are often used for tracking and advertising purposes across multiple websites. Third-party cookies can be used to collect information about your browsing history, interests, and other personal data that can be used to deliver targeted ads or content.

For example, if you visit a website that has third-party cookies enabled, the cookie will be stored on your device by the third-party domain. This cookie can then be accessed by other websites that use the same third-party domain to track your activity across multiple sites. This is how advertisers can show you ads for products or services that you have previously searched for or viewed online.

Source: Conversation with Bing, 17/10/2023
Click for References

49. The cookie apocalypse - 1 of 3

The cookie apocalypse refers to the deprecation of third-party cookies (3PCs) by major web browsers such as Safari, Firefox, and Chrome. Third-party cookies are used to track users across multiple domains and are often used for advertising purposes. The deprecation of 3PCs has been a steady but real looming threat to the status quo of how organizations do business and interact with customers.

The effects of this change can be felt already. According to initial reports, upon launch, only 4 percent of U.S. consumers chose to allow apps to access their IDFA tags. Facebook, which relies on 3PCs to effectively advertise on their network, warned investors of

potential revenue impact, and began testing new ways to acquire consent from their users in response.

The lasting effects of these changes threaten more than just digital advertising. It snaps the thread of what enables organizations to achieve a true 360-view of the customer. If organizations do not put a plan in place that future-proofs their data infrastructure, authentication capabilities and data collection practices to consistently deliver strong business outcomes, they risk losing ground on progress they've already made improving targeting, personalization and experiential relationships with consumers.

Source: Conversation with Bing, 17/10/2023
References

50. The cookie apocalypse - 2 of 3

The cookie apocalypse is not an actual global catastrophe but rather a metaphorical description of the challenges faced by online advertisers and marketers due to several developments:

- **Privacy Regulations**: Various privacy regulations, such as the General Data Protection Regulation (GDPR) in the European Union and the California Consumer Privacy Act (CCPA) in the United States, have imposed stricter rules on data collection and user consent. These regulations limit the use of cookies without user consent and give users more control over their personal data.
- **Browser Changes**: Major web browsers like Google Chrome, Mozilla Firefox, and Apple's Safari have made significant changes to how they handle cookies. For example, many have implemented features like Intelligent Tracking Prevention (ITP) to limit the lifespan and effectiveness of third-party cookies.
- **User Awareness**: As users become more informed about online privacy and the potential risks associated with the use of

cookies, they are increasingly opting out of tracking and blocking cookies through browser settings or browser extensions.
- **Shift to First-Party Data**: Marketers and advertisers are adapting to the changing landscape by shifting their strategies towards collecting and using first-party data, which is data collected directly from users with their consent, rather than relying heavily on third-party cookies.

The *cookie apocalypse* is essentially a way to describe the disruptive impact of these changes on the digital advertising industry. It has forced advertisers and marketers to reevaluate their methods, invest in more transparent and ethical data practices, and develop alternative strategies for reaching their target audience in a more privacy-friendly manner.

Source: Chat GPT

51. The cookie apocalypse - 3 of 3

The cookie apocalypse is essentially the demise of the third-party cookie. Cookie restrictions and bans have gone through various stages.

First, consumers were allowed to opt-in to cookies instead of having them mandatorily imposed on them. Apple's Safari and Mozilla's Firefox started restricting cookies from third-party advertisers in 2013. A few years ago, Microsoft, Brave and Vivaldi also began blocking third-party cookies by default in their respective browsers.

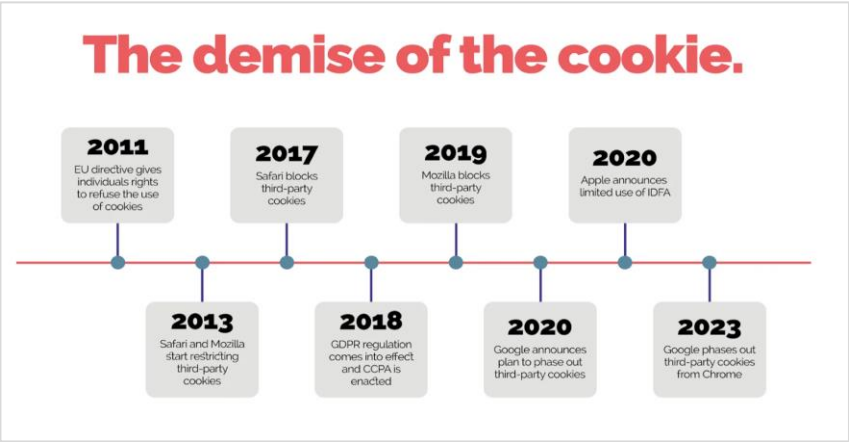
GDPR and CCPA came in full force in 2018 and 2019.

In January 2020, Google announced its plan to deprecate third-party cookies within Chrome in three years. Apple followed suit in

June 2020, announcing that it would limit the use of the Identifier for Advertisers (IDFA) - the mobile device ID used by advertisers for targeting, personalizing and measuring marketing campaigns.

Currently, tracking users across sites and displaying ultra-relevant ads are hyper-relevant the best way to reach the right audience through online advertising. For example, advertisers can specifically target customers who visited a hotel booking site with a travel-related product/service due to third-party cookies.

But without cookies, advertisers will have significantly less access to data than before. Tracking the customer journey of a user as they move from one site to another would not be possible. Additionally, retargeting customers based on previous interactions with ads is another feature that would disappear as a subsequence of the marketing cookie ban.



Source: Conversation with Bing, 21/10/2023
References

52. Conversion metrics

Conversion metrics are essential to track the performance of your advertising campaigns. They help you determine whether your audience is taking a particular action, how much those actions are costing, the overall return on investment (ROI) for your efforts, and so on.

Source: Conversation with Bing, 21/10/2023
References

53. Conversion rate

This is the core conversion metric that measures how many people completed your target action. It is calculated by dividing the total conversions by the total visitors from your ad or campaign.

Source: Conversation with Bing, 21/10/2023
References

54. Cost per acquisition (CPA)

Measures the cost of acquiring a new customer. It is calculated by dividing the total cost of your campaign by the number of new customers acquired.

Source: Conversation with Bing, 21/10/2023
References

55. Customer acquisition cost (CAC):

Measures the cost of acquiring a new customer over a specific period. It is calculated by dividing the total cost of your campaign by the number of new customers acquired over that period.

Source: Conversation with Bing, 21/10/2023
References

56. Click-through rate (CTR)

Measures how often people click on your ads after seeing them. It is calculated by dividing the number of clicks an ad receives by the number of times it is shown (impressions).

Source: Conversation with Bing, 21/10/2023
References

57. Bounce rate

Measures how often people leave your website after viewing only one page. A high bounce rate can indicate that your landing page or website content needs improvement.

Source: Conversation with Bing, 21/10/2023
References

58. Website sessions

Measures how many times users visit your website within a specific period.

Source: Conversation with Bing, 21/10/2023
References

59. Pages per session

Measures how many pages users view on average during each website session.

Source: Conversation with Bing, 21/10/2023
References

60. ROAS (Return On Ad Spend)

Measures how much revenue you generate for every dollar spent on advertising. It is calculated by dividing revenue generated from ads by the cost of those ads.

Source: Conversation with Bing, 21/10/2023
References

61. ACOS (Advertising Cost of Sales)

In programmatic advertising, ACOS (Advertising Cost of Sales) is a metric used to measure Amazon pay-per-click (PPC) advertising campaigns. It compares the amount spent on PPC campaigns to the amount earned and helps determine if your brand generated campaigns that were cost-efficient. Amazon ACOS helps measure the performance of Sponsored Products ads on Amazon.

Amazon ACOS is calculated by dividing ad spend by ad revenue, then converting it to a percentage. For example, if you spent $50 on an ad campaign and earned $100 from it, your Amazon ACOS would be 50%. ACOS = (ad spend ÷ ad revenue) x 100.

Return on ad spend (ROAS) is the inverse of Amazon ACOS: it is calculated by dividing ad revenue by ad spend. In the example above, the ROAS would be 2.

Source: Conversation with Bing, 10/25/2023
References

62. Digital Footprint

A digital footprint refers to the trail of data that a person leaves behind when using the internet. This includes websites visited, emails sent, and information submitted online. A digital footprint can be used to track a person's online activities and devices. It is

created either actively or passively by internet users. Active digital footprints are created when users deliberately share information about themselves, such as posting on social networking sites or online forums. Passive digital footprints are created when information is collected about the user without their knowledge, such as when websites collect information about how many times users visit, where they come from, and their IP address.

Digital footprints matter because they are relatively permanent and can determine a person's digital reputation, which is now considered as important as their offline reputation. Employers can check their potential employees' digital footprints, particularly their social media, before making hiring decisions. Colleges and universities can check their prospective students' digital footprints before accepting them too.

Source: Conversation with Bing, 21/10/2023
References

63. Application programming interface (API)

Application programming interface (API) is a way to programmatically access (usually external) models, data sets, or other pieces of software.

Source: Chat GPT

64. Artificial neural networks (ANNs)

Artificial neural networks (ANNs) are composed of interconnected layers of software-based calculators known as “neurons”. These networks can absorb vast amounts of input data and process that data through multiple layers that extract and learn the data’s features.

References

65. Programmatic advertising

Programmatic advertising is the automated process of purchasing digital ad inventory across the web, mobile, apps, video, and social media within advertiser-defined parameters. It uses machine learning algorithms to deliver the most effective ads to audiences based on a variety of signals, like shopping patterns.

Programmatic ad buying takes place when consumers click on a publisher's website, and the publisher puts the ad impression up for auction through header bidding and one or more SSPs.

Then, the DSP bids on behalf of the advertiser for that impression based on campaign's strategies, budget, creative sizes, and other factors.

The publisher automatically assigns impressions to the winning bidder -the advertiser/DSP offering the highest CPM (cost per mille, or the cost per one thousand advertising impressions).

Source: Conversation with Bing, 10/25/2023
References

66. Supply-Side Platform (SSP)

In programmatic advertising, a Supply-Side Platform (SSP) is a software used by digital publishers to sell ad inventory programmatically to advertisers. It allows publishers to easily manage their inventory and maximize their earnings by connecting them with multiple demand-side platforms (DSPs), ad exchanges, and ad networks at once. By doing so, SSPs let publishers sell impressions to a greater pool of potential buyers and allows suppliers to set the bidding range to maximize their revenue. SSPs

provide similar functionality and technology as DSPs, but are used by publishers to help optimize and get the best offer for their inventory (aka maximize yield).

In programmatic ad buying, when consumers click on a publisher's website, the publisher puts the ad impression up for auction through header bidding and one or more SSPs. Then, the DSP bids on behalf of the advertiser for that impression based on campaign's strategies, budget, creative sizes, and other factors. The publisher automatically assigns impressions to the winning bidder—the advertiser/DSP offering the highest CPM (cost per mille, or the cost per one thousand advertising impressions).

Source: Conversation with Bing, 10/25/2023
References

67. Demand-Side Platform (DSP)

In programmatic advertising, a Demand-Side Platform (DSP) is a software used by advertisers to purchase ad inventory programmatically across the web, mobile, apps, video, and social media within advertiser-defined parameters. It allows advertisers to easily manage their campaigns and maximize their ROI by connecting them with multiple supply-side platforms (SSPs), ad exchanges, and ad networks at once. By doing so, DSPs let advertisers buy impressions from a greater pool of potential publishers and allows buyers to set the bidding range to maximize their revenue. DSPs provide similar functionality and technology as SSPs, but are used by advertisers to help optimize and get the best offer for their campaigns (aka maximize yield).

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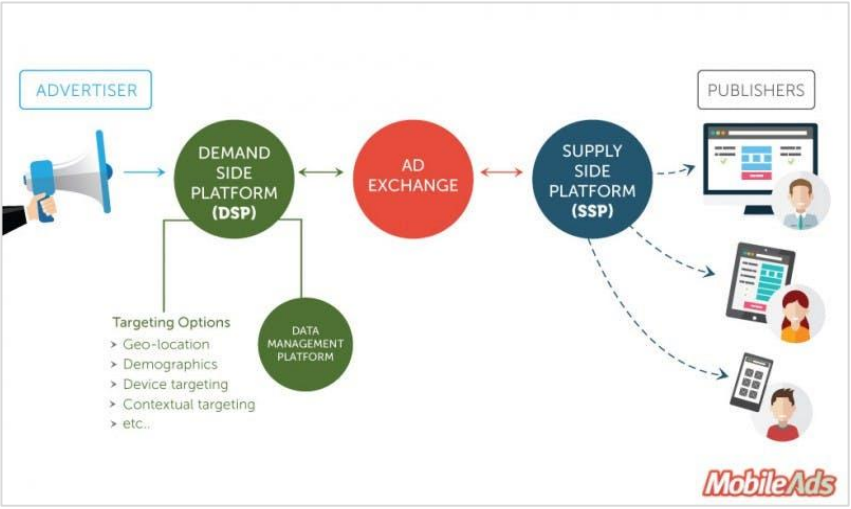


[Your Ultimate Guide to Programmatic Advertising Terms | Digital Marketing Institute]

Source: Conversation with Bing, 10/25/2023
References

68. Ad Exchange - 1 of 2

In programmatic advertising, an Ad Exchange is a digital marketplace that enables advertisers and publishers to buy and sell ad inventory programmatically in real-time. Ad exchanges allow advertisers to bid on targeted ads shown to specific publishers and users, evaluating the value of the publisher and user to determine how much to pay for the ad. Ad exchanges use a real-time-bidding technology to run auctions, gathering ad

networks, DSPs, publishers, and advertisers to sell inventory to the highest bidder on an impression-by-impression basis.

Source: Conversation with Bing, 10/25/2023
References

69. Ad exchange - 2 of 2

In programmatic advertising, an ad exchange is an online marketplace where advertisers, agencies, demand-side platforms, publishers, and supply-side platforms can bid on advertising inventory from various publishers using RTB. Advertisers determine the price by participating in the bidding process. Additionally, with an ad exchange, advertisers gain visibility regarding where their ads will appear.

References

70. Real Time Bidding (RTB)

Real-Time Bidding (RTB) is a form of programmatic advertising that allows for the buying and selling of digital ads in real time. When users visit a website or mobile app, a real-time auction is conducted where advertisers bid and compete for an ad space. If the advertiser has the highest bid in the auction, their ad is displayed on a publisher's website or mobile app.

RTB is facilitated through a process that involves supply side platforms (SSPs), demand side platforms (DSPs), and ad exchanges:

- **Supply Side Platform (SSP)**: This is programmatic software for publishers to facilitate sales of their advertising impressions. By connecting publishers with multiple ad exchanges, demand-

side platforms, and ad networks all at once, SSPs let publishers sell impressions to a greater pool of potential customers.
- **Demand Side Platform (DSP)**: This is programmatic software for advertisers that provides automated, centralized media buying from multiple sources. Advertisers seek inventory that will help them reach the right audiences at the right time, within a defined budget.
- **Ad Exchange**: In programmatic advertising, an ad exchange is an online marketplace where advertisers, agencies, DSPs, publishers, and SSPs can bid on advertising inventory from various publishers using RTB.

Overall, RTB helps make the buying and selling of programmatic ads more efficient. Traditional advertising requires time to develop requests for proposals (RFPs) and quotes, conduct negotiations, and create insertion orders. Through RTB, advertisers can buy and place ads quickly with more control over the process. It's important to note that RTB is performed through an automated auction-based system, where buyers and sellers of ad space are connected in an open marketplace.

Source: Conversation with Bing, 10/26/2023
References

71. Header Bidding

Header Bidding, also referred to as "pre-bidding" or "advanced bidding", is a programmatic advertising technique in Real-Time Bidding (RTB) which allows publishers to put their available ad space impressions (also referred to as "ad inventory") up for auction across multiple demand sources at once.

Here's how it works:
1. Publishers send bid requests to multiple ad exchanges and other demand partners simultaneously.

2. Bids from multiple demand sources can be placed on their ad inventory at the same time.
3. This increases ad space competition, raises average bid prices, and allows for optimizations like seeking the best ad network payout from various channels.

Compared to the traditional waterfall method, which often caused page loading latency, header bidding is capable of reducing the time needed to conclude auctions and display ad creatives on a web page. It was introduced around 2014-2017, several years after RTB's introduction in 2009.

The key advantage of header bidding is that it enables publishers to maximize their revenue by increasing competition for their ad inventory. It also provides advertisers with more opportunities to access premium ad inventory.

Source: Conversation with Bing, 10/26/2023
References

72. Private Marketplaces

Private Marketplaces (PMPs) in Real-Time Bidding (RTB) are customized, invitation-only RTB marketplaces where premium publishers make their inventory and audiences available to a select group of buyers. Unlike the open exchange, at auction the buyer knows which site/s the ad impressions will run on.

Here's how it works:

- A negotiation takes place between the buyer and seller to create and agree on a private deal.
- During this process, a Deal ID is provided by the publisher and given to the buyer – and it can be used to set up their PMP in a Demand Side Platform (DSP).
- Deal IDs act as a key to the private marketplace.

- When a deal ID is negotiated, both parties are agreeing on two things: Approved access and a set of buying parameters like floor price and inventory type.
- While private marketplace transactions are still subject to an auction, the competition is limited to buyers who have been invited to partake in the auction.

PMPs are home to exclusive inventory that is not available on the public market and usually targets a high-value audience.

Using a PMP is a strategic decision that can offer several benefits such as ensuring that ads are running at all times, achieving specific packages from a publisher, or when the advertiser is blocked in the open marketplace (like pharma or gambling).

Source: Conversation with Bing, 10/26/2023
References

73. Programmatic Direct

Programmatic Direct is a method of programmatic advertising that involves a direct deal between an advertiser and a publisher, without involving exchange parties. In Programmatic Direct, advertisers approach publishers directly to buy ad space.

Here's how it works:
- This process is facilitated through an advertising platform like a Demand Side Platform (DSP), Supply Side Platform (SSP), or ad exchange.
- It's a one-to-one basis of buying ads directly from publishers.
- It offers more control for both sides as it covers non-auction based deals.

Direct programmatic deals offer guaranteed Cost Per Mille (CPM) and impressions for a fixed price and duration, simplifying sales as they occur in a single system.

Programmatic Direct is perfect for publishers looking for greater control over their inventory. In addition, it gives advertisers direct control over ad sales on premium pages. It can help relieve some of the associated security burden as publishers can benefit from knowing the ad creatives, the amount of impressions required, viewer categories, and more. Publishers have greater leverage over their ad inventory and this can help them improve their processes.

Source: Conversation with Bing, 10/26/2023
References

74. Programmatic Guaranteed

Programmatic Guaranteed (PG) in Real-Time Bidding (RTB) is a method of programmatic advertising where an advertiser and a publisher agree on a fixed number of impressions that the buyer has committed to purchasing. The Cost Per Mille (CPM), ad sizes, and start/end date for the deal are all fixed.

Here's how it works:

- The advertiser identifies specific websites and/or apps where they want to show their ads, sometimes also considering particular time slots.
- The advertiser uses a Demand Side Platform (DSP) to contact publishers and start the negotiation process.
- Both sides agree on specific ad placements, a fixed price (usually based on the placement of the ad, audience demographics, and time when you want to show your ads), guaranteed volumes, and particular time slots.
- Once the advertiser and publisher are on the same page, they are obliged to fulfill the agreement.

- Then, the advertiser creates an ad campaign and submits it to the publisher, and ads are displayed.

Programmatic Guaranteed deals offer a certain level of security regarding ad inventory. Advertisers can rest assured that their ads will be shown to their target audience, and publishers can celebrate filling their premium ad slots and reducing the chances that they will be left unsold. This process enables direct deals between advertisers and publishers but lets them avoid various manual processes, like exchanging tags or handling multiple invoices.

Source: Conversation with Bing, 10/26/2023
References

75. Native Advertising

In programmatic advertising, native advertising is a form of paid advertising that matches the form and function of the platform on which it appears. It is designed to blend in with the surrounding content and provide a seamless user experience. Native ads can appear in various formats such as sponsored content, in-feed ads, search ads, promoted listings, and more.

Native advertising is different from traditional display or banner ads because it is less intrusive and more contextual. It is often used by advertisers to promote their products or services in a way that feels organic and non-disruptive to the user experience.

Source: Conversation with Bing, 10/25/2023
References

76. Native Spend

In programmatic advertising, native spend refers to the amount of money spent on native advertising campaigns. Native advertising

is a form of paid media that matches the form and function of the platform on which it appears. It is designed to blend in with the surrounding content and provide a seamless user experience. Native ads can appear in various formats such as sponsored content, in-feed ads, search ads, promoted listings, and more.

Source: Conversation with Bing, 10/25/2023
References

77. Frequency capping

Frequency capping in Real-Time Bidding (RTB) is a method that limits the number of times a user sees an ad from a given entity (such as a campaign, creative, line item, and so on) within a designated time period. This method is used to prevent budget waste on numerous impressions for the same user and can potentially broaden the reach of a campaign.

You can specify frequency caps based on several properties:

- **ID:** The property sets the frequency capping that you require. This unit could be at the level of the campaign, creative, line item, advertiser, or other element.
- **Time unit**: The property establishes the duration for which the frequency capping will last.
- **Time range**: The property limits the number of times that an impression can be seen over the established time unit.
- **Max impressions**: The property sets the limit on how many times a user can see an impression for the established time unit and time range.

This method is more privacy-centric as it allows for frequency cap enforcement without sharing user identifiers in bid requests.

Source: Conversation with Bing, 10/26/2023
References

78. Bid forecasting

Bid forecasting in Real-Time Bidding (RTB) is a predictive process that aims to estimate the probabilistic distribution density with respect to the market price given an ad auction information. This information is typically represented by a high-dimensional feature vector.

The goal of bid forecasting is to provide advertisers with insights into the potential outcomes of their bids, helping them make more informed decisions about their bidding strategies. It can help predict the likelihood of winning an auction at various bid prices, which can be crucial for optimizing ad spend and maximizing return on investment.

It's important to note that bid forecasting is a complex process that involves analyzing historical data, understanding market trends, and applying sophisticated machine learning algorithms. It's a key component of programmatic advertising and plays a vital role in the RTB ecosystem.

Source: Conversation with Bing, 10/26/2023
References

79. Ad verification services

Ad verification services in Real-Time Bidding (RTB) are used to ensure the quality and appropriateness of ad placements. These services play a crucial role in maintaining brand safety, preventing malware, and avoiding other types of ad scams that could interfere with the user experience.

Here are some key features of ad verification services:

- **Identification of Bot Traffic**: These services can identify and report on the percentage of traffic that is at high risk for being fraudulent or invalid.

- **Ensuring Brand Safety**: They manage ad placement and verify whether ads were served within domains with potentially safe brand environments.
- **Blacklist Maintenance**: Ad verification services can help maintain blacklists to try to prevent ads from showing in dubious positions.

By using these services, advertisers can ensure that their ads are being displayed in the intended manner and in the right context, thereby protecting their brand image and maximizing the effectiveness of their advertising campaigns.

Source: Conversation with Bing, 10/26/2023
References

80. Digital Out-Of-Home

Digital Out-Of-Home (DOOH) is a form of media that falls under the umbrella of outdoor or out-of-home (OOH) advertising. It involves the use of digital media for promotional purposes in public spaces. DOOH allows brands to connect with consumers as they go about their daily lives, delivering contextually relevant content to targeted audiences at scale.

While out-of-home media is not new (in fact it's one of the oldest traditional media worldwide), digitization of outdoor advertising is occurring at a rapid pace and the market is responding. When there is digitization, we also see several integrations, apps and SaaS solutions being offered, something that OOH is experiencing as it transforms itself to a smarter, data-driven version called DOOH.

Source: Conversation with Bing, 10/26/2023
References

81. BOT

A bot is a software application that is programmed to do certain tasks automatically, without human intervention. Bots can be useful or harmful, depending on their purpose and design. Some examples of bots are:

- **Web crawlers**: Bots that scan and index web pages for search engines.
- **Chatbots**: Bots that simulate human conversation and provide information or assistance to users.
- **Malicious bots**: Bots that perform harmful actions, such as stealing data, spreading spam, or attacking websites.

Bots are also called robots, agents, or programs.

Source: Conversation with Bing, 10/30/2023
References

82. Augmented reality (AR)

Augmented reality (AR) is a technology that combines the real world and computer-generated content, such as images, sounds, or other information. AR can enhance one's perception of the environment and provide interactive and immersive experiences. AR can be used for various purposes, such as education, entertainment, healthcare, and marketing.

Augmented Reality (AR) is a technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view. It is an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology.

AR can be defined as a system that incorporates three basic features:

- A combination of real and virtual worlds
- Real-time interaction
- Accurate 3D registration of virtual and real objects

The overlaid sensory information can be constructive (i.e., additive to the natural environment), or destructive (i.e., masking of the natural environment). This experience is seamlessly interwoven with the physical world such that it is perceived as an immersive aspect of the real environment. In this way, augmented reality alters one's ongoing perception of a real-world environment, whereas virtual reality completely replaces the user's real-world environment with a simulated one.

AR has found applications in various fields such as retail, where it enhances the consumer shopping experience, and healthcare, where it serves as a powerful learning tool for training medical professionals.

Source: Conversation with Bing, 10/31/2023
References

83. Virtual Reality (VR)

Virtual Reality (VR) is a technology that involves the use of computer modeling and simulation to create an artificial three-dimensional (3-D) visual or another sensory environment. It allows a person to interact with this environment in a seemingly real or physical way, typically by using special electronic equipment such as a helmet with a screen inside or gloves fitted with sensors.

The user becomes part of this virtual world or is immersed within this environment and while there, is able to manipulate objects or perform a series of actions. The user's actions partially determine what happens in the environment.

Unlike Augmented Reality (AR), which enhances the real world with digital elements, VR completely replaces the user's real-world environment with a simulated one.

VR has found applications in various fields such as gaming, training and education, and virtual tours among others.

Source: Conversation with Bing, 10/31/2023
References

84. Hyper-Personalization

Hyper-Personalization through AI is a cutting-edge approach to marketing and customer experience that harnesses the power of artificial intelligence to serve individual users. It uses customer information to tailor content, products, and services to a customer's wants and preferences. The data used includes profile and demographic data, location, browsing, and purchasing decisions. This data is analyzed to create a customer profile and inform dynamic personalization of content and offers.

The use of AI in hyper-personalization lets you create and adjust customer profiles in real time. AI algorithms can readjust behavioral data incrementally based on each new interaction, making marketing campaigns progressively smarter as they roll out across more customers and channels.

Hyper-personalization treats customers as individuals with distinct tastes and preferences, enabling brands and retailers to provide a unique customer experience that's different for each shopper. It allows businesses to create customized experiences that resonate personally, increasing satisfaction, engagement, and loyalty.

Key functions of a hyper-personalization technique or technology include:

- **Data Collection**: Obtain data to know customer needs and preferences. This means collecting information on all client segments. To do this, combine data from web analytics, CRM, and customer support interactions. Some of the more important factors include geolocation, brand interaction history, average spending, demographics, and satisfaction level.
- **Client Segmentation**: Once your information is gathered and analyzed, you can start segmenting your client base. Segmentation helps you produce hyper-personalized messaging and interactive routes for customers. Hyper personalization requires automating segmentation at some level, otherwise becomes infeasible at large scale.

By offering hyper-personalized experiences to the customer, businesses can achieve increased satisfaction, engagement, and loyalty.

Source: Conversation with Bing, 10/31/2023
References

85. Attribution Models

Attribution Models are frameworks or approaches used in marketing and analytics to allocate credit or value to numerous touchpoints or marketing channels that contribute to a desired outcome, such as a conversion, sale, or other quantifiable action. They determine how credit for sales and conversions is assigned to different channels across different touchpoints in the buyer journey.

The purpose of attribution modeling is to increase the chances of converting more prospects by identifying areas of the buyer's journey that can be improved, determining the ROI for each channel or touchpoint, surfacing the most effective ways to spend your marketing budget, and tailoring marketing campaigns and content to unique personas.

There are several types of attribution models, each weighing channels and touchpoints differently:

- **Multi-Touch Attribution Modeling**: Considers every channel and touchpoint that a customer interacted with throughout the buyer's journey, up until they decided to convert.
- **Cross-Channel Attribution Modeling**: Designates value to each marketing channel (such as paid, organic, or social media) but doesn't look at the specific touchpoints within those channels.
- **Linear Attribution Modeling**: Assigns equal credit to each touchpoint along the customer's journey.

By using attribution models, marketers can understand how different channels and touchpoints contribute to each sale.

Source: Conversation with Bing, 10/31/2023
References

86. Deepfakes

Deepfakes are a type of synthetic media where a person's image or video is swapped with another person's likeness. This is achieved through deep learning techniques, hence the name "deepfakes", which is a portmanteau of "deep learning" and "fake".

Deepfakes involve the manipulation of facial appearance through deep generative methods. They leverage powerful techniques from machine learning and artificial intelligence to manipulate or generate visual and audio content that can convincingly deceive. The main machine learning methods used to create deepfakes are based on deep learning and involve training generative neural network architectures.

While the act of creating fake content is not new, deepfakes have garnered widespread attention for their potential use in creating misleading videos, fake news, hoaxes, and financial fraud. This has elicited responses from both industry and government to detect and limit their use.

Source: Conversation with Bing, 10/31/2023
References

87. The alignment problem

The alignment problem is a challenge of ensuring that artificial intelligence systems, especially those that are powerful and general-purpose, act in accordance with human values and intentions. It is a multidisciplinary field that involves computer science, ethics, psychology, and law. Some of the subproblems of the alignment problem include:

- How to define and measure human values and preferences in a way that can be understood and optimized by AI systems.
- How to avoid or mitigate undesirable side effects, biases, or errors in AI systems that may harm humans or the environment.
- How to ensure that AI systems are transparent, accountable, and trustworthy, and that humans can understand and control their behavior.
- How to prevent or resolve conflicts between different AI systems or between AI systems and humans, especially in cases of moral dilemmas or existential risks.

The alignment problem is an important and urgent issue, as AI systems become more capable and ubiquitous, and may have significant impacts on human society and well-being. There are many researchers and organizations working on various aspects of the alignment problem, such as OpenAI, DeepMind, the Partnership on AI, and the Center for Human-Compatible AI.

Source: Conversation with Bing, 03/11/2023
References

88. Goodhart's law

Goodhart's law is a principle that states that when a measure becomes a target, it ceases to be a good measure. This means that if a certain indicator is used to evaluate the performance of a system or a policy, it will lose its reliability as people will try to manipulate it to achieve their desired outcomes. For example, if a school uses test scores to measure the quality of education, teachers and students may focus on teaching and learning to the test, rather than acquiring the skills and knowledge that the test is supposed to measure. Goodhart's law was proposed by British economist Charles Goodhart in 1975, based on his observations of the effects of monetary policy in the United Kingdom.

Source: Conversation with Bing, 03/11/2023
References

89. Moore's law

Moore's law is the observation that the number of transistors on a microchip doubles about every two years, while the cost of computers is halved. It also suggests that the growth of microprocessors is exponential. Moore's law was named after Gordon Moore, the co-founder and former CEO of Intel, who made this prediction in 1965 based on the trends he noticed in the semiconductor industry. Moore's law has been a driving force of technological and social change, productivity, and economic growth, as it has enabled the development of faster, smaller, and cheaper computers and devices that have transformed various fields and sectors. However, Moore's law also faces some challenges and limitations, such as physical, economic, and environmental factors, that may slow down or stop its progress in the future.

Source: Conversation with Bing, 11/20/2023
References

90. Zettabyte - 1 of 2

A *zettabyte* is a unit of digital information storage that represents (2^{70}) power bytes, or 1,000 exabytes, or **1 trillion gigabytes**.

It is an enormous amount of data, and it's difficult to comprehend its scale. To put it into perspective, consider this: every day we are generating over 2.5 quintillion or 2.5 exabytes of data.

Source: Conversation with Bing, 21/10/2023
References

91. Zettabyte - 2 of 2

A zettabyte is 1021 or 1,000,000,000,000,000,000,000 bytes.
One zettabyte (abbreviated "ZB") is equal to 1,000 exabytes and precedes the yottabyte unit of measurement. Zettabytes are slightly smaller than zebibytes, which contain 1,180,591,620,717,411,303,424 (270) bytes.

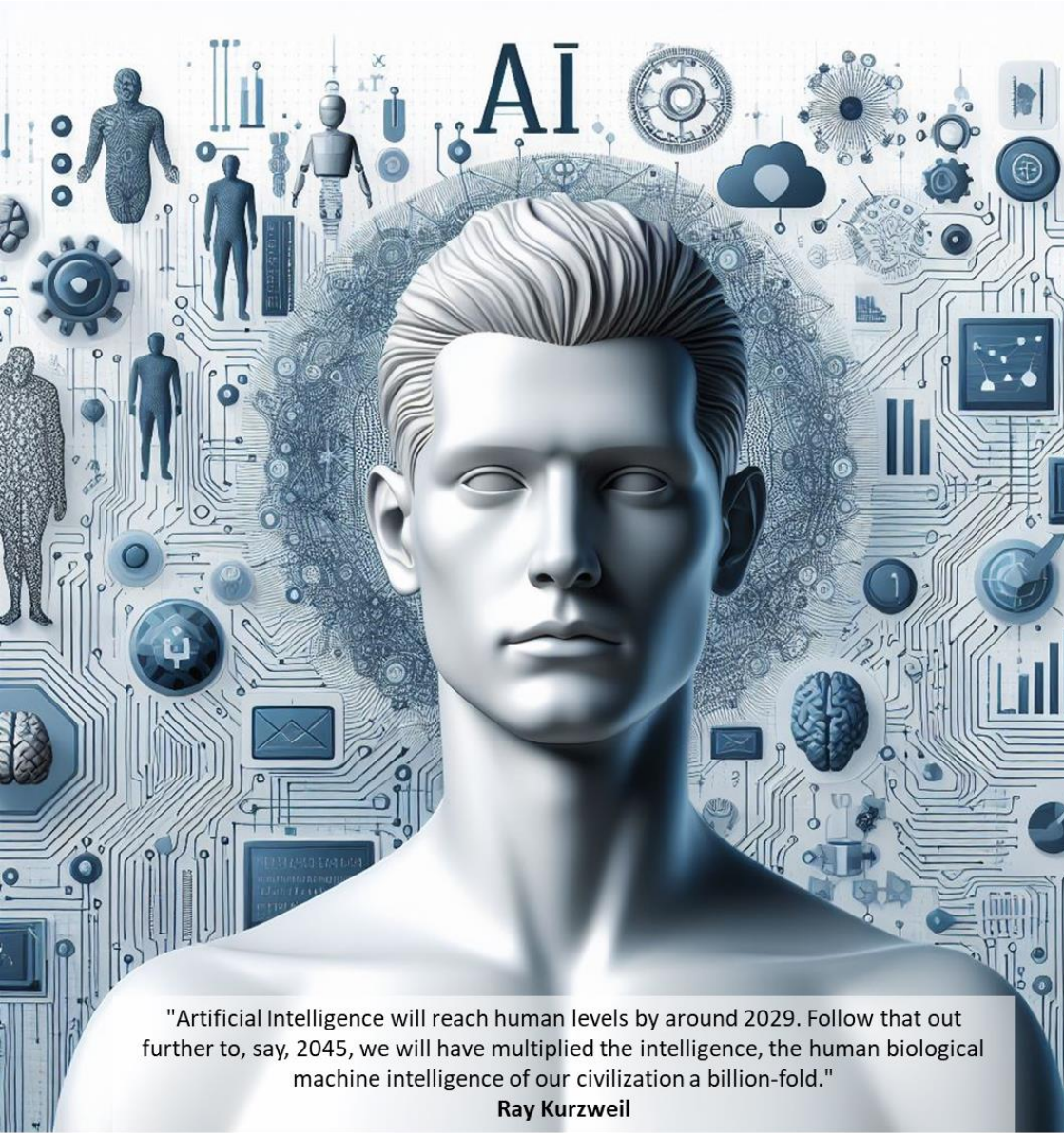
A single zettabyte contains one sextillion bytes, or one billion terabytes. That means *it would take one billion one terabyte hard drives to store one zettabyte of data*. Because the zettabyte unit of measurement is so large, it is only used to measure large aggregate amounts of data. Even all the data in the world is estimated to be only a few zettabytes.

References

92. Units of measurements for data storage

Unit	Value	Size
bit (b)	0 or 1	1/8 of a byte
byte (B)	8 bits	1 byte
kilobyte (KB)	1000^1 bytes	1,000 bytes
megabyte (MB)	1000^2 bytes	1,000,000 bytes
gigabyte (GB)	1000^3 bytes	1,000,000,000 bytes
terabyte (TB)	1000^4 bytes	1,000,000,000,000 bytes
petabyte (PB)	1000^5 bytes	1,000,000,000,000,000 bytes
exabyte (EB)	1000^6 bytes	1,000,000,000,000,000,000 bytes
zettabyte (ZB)	1000^7 bytes	1,000,000,000,000,000,000,000 bytes
yottabyte (YB)	1000^8 bytes	1,000,000,000,000,000,000,000,000 bytes

References



Images from Bing Images

B. References

Artificial Intelligence (AI) - 2 of 2

AI in Advertising: The Ultimate Guide | IBM Watson Advertising. (n.d.). Www.ibm.com. https://www.ibm.com/watson-advertising/thought-leadership/ai-in-advertising

Narrow AI (Weak AI)

Rouse, M. (2023, October 2). *What is Narrow Artificial Intelligence (Narrow AI)? - Definition from Techopedia*. Techopedia.com. https://www.techopedia.com/definition/32874/narrow-artificial-intelligence-narrow-ai

deepai. (2019, May 17). *Narrow AI*. DeepAI. https://deepai.org/machine-learning-glossary-and-terms/narrow-ai

Spiceworks. (2022, March 22). *What Is Narrow Artificial Intelligence (AI)? Definition, Challenges, and Best Practices for 2022 | Spiceworks*. Spiceworks. https://www.spiceworks.com/tech/artificial-intelligence/articles/what-is-narrow-ai/

Narrow AI definition. (n.d.). Bing. https://bing.com/search?q=Narrow+AI+definition

Artificial General Intelligence (AGI) (Strong AI)

IBM. (2023). *What is artificial intelligence (AI)?* IBM; IBM. https://www.ibm.com/topics/artificial-intelligence

bell, E. (2023, August 2). *Artificial General Intelligence (AGI): Definition, How It Works, and Examples*. Investopedia. https://www.investopedia.com/artificial-general-intelligence-7563858

Heath, N. (2019, April). *What is artificial general intelligence?* ZDNet; ZDNet. https://www.zdnet.com/article/what-is-artificial-general-intelligence/

Wikipedia Contributors. (2019, September 4). *Artificial general intelligence*. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Artificial_general_intelligence

Artificial General Intelligence definition. (n.d.). Bing. Retrieved December 4, 2023, from https://bing.com/search?q=Artificial+General+Intelligence+definition

Definition of Artificial general intelligence (AGI) - Gartner Information Technology Glossary. (n.d.). Gartner. https://www.gartner.com/en/information-technology/glossary/artificial-general-intelligence-agi

Artificial General Intelligence Definition: Examples, Challenges, And Approaches. (2022, October 6). https://dataconomy.com/2022/10/06/artificial-general-intelligence-definition/

Coursera. (2023, July 28). *What is Artificial Intelligence? Definition, Uses, and Types*. Coursera. https://www.coursera.org/articles/what-is-artificial-intelligence

Super AI

Kanade, V. (2022, March 11). *What Is Super Artificial Intelligence (AI)? Definition, Threats, and Trends*. Spiceworks. https://www.spiceworks.com/tech/artificial-intelligence/articles/super-artificial-intelligence/

Process 100% of Complex Documents | super.AI. (n.d.). Super.ai. https://super.ai/

What Is Super AI? – Understanding AI – Leveraging The Advantages Of Artificial Intelligence. (2023, September 8). https://www.understandingai.net/what-is-super-ai/

Crunchbase. (2021). Crunchbase. https://www.crunchbase.com/organization/canotic

Generative AI - 1 of 2

What Is Generative AI? Definition, Applications, and Impact. (2023, August 17). Coursera. https://www.coursera.org/articles/what-is-generative-ai

Definition of Generative AI - Gartner Information Technology Glossary. (n.d.). Gartner. https://www.gartner.com/en/information-technology/glossary/generative-ai

Routley, N. (2023, February 1). *Infographic: Generative AI Explained by AI*. Visual Capitalist. https://www.visualcapitalist.com/generative-ai-explained-by-ai/

Gartner. (2023). *Generative AI: What Is It, Tools, Models, Applications and Use Cases*. Gartner. https://www.gartner.com/en/topics/generative-ai

Generative AI - 2 of 2

Page not found | McKinsey & Company. (n.d.). Www.mckinsey.com. https://www.mckinsey.com/~/media/McKinsey/Business

Predictive AI

IBM. (2023). *What Is Predictive Analytics? | IBM*. Www.ibm.com. https://www.ibm.com/topics/predictive-analytics

CLOUDFLARE. (n.d.). *What is predictive AI?* (CLOUDFLARE, Ed.) [Review of *What is predictive AI?*]. CLOUDFLARE; CLOUDFLARE. Retrieved December 4, 2023, from https://www.cloudflare.com/learning/ai/what-is-predictive-ai/

Predictive Intelligence - ServiceNow. (2019). ServiceNow. https://www.servicenow.com/products/predictive-intelligence.html

Conversational AI

What is conversational AI: examples and benefits. (n.d.). Google Cloud. Retrieved December 4, 2023, from https://cloud.google.com/conversational-ai

All About Conversational AI in 2024: Why Is It Integral For Your Business? (2023, December 4). Verloop.io. https://verloop.io/blog/what-is-conversational-ai/

The Essential Guide to Conversational AI. (2021, June 3). REVE Chat. https://www.revechat.com/blog/conversational-ai/

IBM. (2023). *What is Conversational AI | IBM*. Www.ibm.com. https://www.ibm.com/topics/conversational-ai

Emotion AI

Somers, M. (2019, March 8). *Emotion AI, explained | MIT Sloan*. MIT Sloan. https://mitsloan.mit.edu/ideas-made-to-matter/emotion-ai-explained

Affective Computing: In-Depth Guide to Emotion AI. (n.d.). Research.aimultiple.com. https://research.aimultiple.com/affective-computing/

Wikipedia. (2019, March 14). *Sentiment analysis*. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Sentiment_analysis

Labbé, A. (2022, November 23). *Council Post: Emotion AI: Why It's The Future Of Digital Health*. Forbes. https://www.forbes.com/sites/forbestechcouncil/2022/11/23/emotion-ai-why-its-the-future-of-digital-health/

Visual AI

Understanding Visual Artificial Intelligence (Visual AI). (2022, December 22). https://dataconomy.com/2022/12/22/visual-artificial-intelligence-ai/

What is Visual AI? Everything You Need to Know. (n.d.). Syte | the World's #1 Product Discovery Platform for ECommerce. https://www.syte.ai/blog/visual-ai/what-is-visual-ai/

IBM. (n.d.). *Computer Vision*. IBM. https://www.ibm.com/topics/computer-vision

Marr, B. (2018, February 14). The Key Definitions Of Artificial Intelligence (AI) That Explain Its Importance. *Forbes*.

https://www.forbes.com/sites/bernardmarr/2018/02/14/the-key-definitions-of-artificial-intelligence-ai-that-explain-its-importance/

Adaptive AI (Real-Time Adaptability in AI)

Definition of Adaptive AI - Gartner Information Technology Glossary. (n.d.). Gartner. https://www.gartner.com/en/information-technology/glossary/adaptive-ai

Adaptive AI in 2023: Components, Use Cases, Ethics & Potential of Adaptive AI. (n.d.). Splunk-Blogs. https://www.splunk.com/en_us/blog/learn/adaptive-ai.html

Why Adaptive AI Should Matter to Your Business. (n.d.). Gartner. https://www.gartner.com/en/articles/why-adaptive-ai-should-matter-to-your-business

Trustworthy AI

Trustworthy Artificial Intelligence (AI)™. (n.d.). Deloitte United States. https://www2.deloitte.com/us/en/pages/deloitte-analytics/solutions/ethics-of-ai-framework.html

Trustworthy AI. (2021, February 9). IBM Research.

https://research.ibm.com/topics/trustworthy-ai

Trustworthy AI. (2023, December 2). Wikipedia. https://en.wikipedia.org/wiki/Trustworthy_AI

Explainable AI

IBM. (n.d.). *What is explainable AI? | IBM*. Www.ibm.com. https://www.ibm.com/topics/explainable-ai

Explainable AI. (n.d.). Google Cloud. https://cloud.google.com/explainable-ai/

Explainable artificial intelligence. (2020, February 26). Wikipedia. https://en.wikipedia.org/wiki/Explainable_artificial_intelligence

Safe AI

SafeAI | Autonomous Mining & Autonomous Construction Solutions. (n.d.). Www.safeai.ai. https://www.safeai.ai/

Center for AI Safety (CAIS). (n.d.). Www.safe.ai. https://www.safe.ai/

make-safe-ai/is-bing-chat-safe. (n.d.). Www.make-Safe-Ai.com. Retrieved December 4, 2023, from https://www.make-safe-ai.com/

SafeAI | Autonomous Mining & Autonomous Construction Solutions. (n.d.). Www.safeai.ai. Retrieved December 4, 2023, from https://www.safeai.ai/ja/

Human-Aware AI

Sreedharan, S. (2023). Human-Aware AI – A Foundational Framework for Human-AI Interaction. *Proceedings of the AAAI Conference on Artificial Intelligence*, *37*(13), 15455–15455. https://doi.org/10.1609/aaai.v37i13.26822

Human-aware A.I. helps accelerate scientific discoveries, new research shows | University of Chicago News. (2023, July 14). News.uchicago.edu. https://news.uchicago.edu/story/human-aware-ai-helps-accelerate-scientific-discoveries-new-research-shows

Sourati, J., & Evans, J. (2023, June 2). *Accelerating science with human-aware artificial intelligence*. ArXiv.org. https://doi.org/10.48550/arXiv.2306.01495

Sreedharan, S. (2023). Human-Aware AI – A Foundational Framework for Human-AI Interaction. *Proceedings of the AAAI Conference on Artificial Intelligence*, *37*(13), 15455–15455. https://doi.org/10.1609/aaai.v37i13.26822

Machine learning (ML) - 2 of 3

IBM Watson Advertising. (2021, February 24). *5 Benefits of Machine Learning in Advertising | IBM Watson Advertising Thought Leadership*. Www.ibm.com. https://www.ibm.com/watson-advertising/thought-leadership/benefits-of-machine-learning-in-advertising

Machine learning (ML) - 3 of 3

McKinsey & Company. (2023, June). *The economic potential of generative AI - The next productivity frontier* (McKinsey & Company, Ed.) [Review of *The economic potential of generative AI - The next productivity frontier*]. McKinsey & Company. www.mckinsey.com

Deep learning

IBM. (2023). *What is Deep Learning?* Www.ibm.com. https://www.ibm.com/topics/deep-learning

Brownlee, J. (2016, September 22). *What is Deep Learning?* Machine Learning Mastery. https://machinelearningmastery.com/what-is-deep-learning/

Dataquest. (2023, March 31). *Tutorial: Introduction to Deep Learning*. Dataquest. https://www.dataquest.io/blog/tutorial-introduction-to-deep-learning/

Do you know what deep learning is? (2022). Oracle.com. https://www.oracle.com/artificial-intelligence/machine-learning/what-is-deep-learning/

What Is Deep Learning? Definition, Examples, and Careers. (n.d.). Coursera. https://www.coursera.org/articles/what-is-deep-learning

Natural language processing (NLP)

IBM. (2023). *What is Natural Language Processing? | IBM*. IBM. https://www.ibm.com/topics/natural-language-processing

Generative Adversarial Network (GAN)

Wood, T. (2020, July 22). *Generative Adversarial Network*. DeepAI. https://deepai.org/machine-learning-glossary-and-terms/generative-adversarial-network

Wikipedia Contributors. (2019, May 17). *Generative adversarial network*. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Generative_adversarial_network

Roy, R. (2019, January 15). *Generative Adversarial Network (GAN)*. GeeksforGeeks. https://www.geeksforgeeks.org/generative-adversarial-network-gan/

A Beginner's Guide to Generative Adversarial Networks (GANs). (n.d.). Pathmind. https://wiki.pathmind.com/generative-adversarial-network-gan

Foundation models (FM)

McKinsey & Company. (2023, June). *The economic potential of generative AI - The next productivity frontier* (McKinsey & Company, Ed.) [Review of *The economic potential of generative AI - The next productivity frontier*]. McKinsey & Company. www.mckinsey.com

Self-attention

McKinsey & Company. (2023, June). *The economic potential of generative AI - The next productivity frontier* (McKinsey & Company, Ed.) [Review of *The economic potential of generative AI - The next productivity frontier*]. McKinsey & Company. www.mckinsey.com

Unstructured data

McKinsey & Company. (2023, June). *The economic potential of generative AI - The next productivity frontier* (McKinsey & Company, Ed.) [Review of *The economic potential of generative AI - The next productivity frontier*]. McKinsey & Company. www.mckinsey.com

Generative AI agents

Hughes, O. (2023, May 4). *Generative AI defined: How it works, benefits and dangers*. TechRepublic. https://www.techrepublic.com/article/what-is-generative-ai/

Sharma, R. (2023, May 19). Intelligent Agents that Astound: Generative AI agents - Markovate. *Markovate*. https://markovate.com/blog/generative-ai-agents/

Generative AI Agents Use Cases for Manufacturers: Top Examples | Attri.ai Blog. (n.d.). Attri.ai. Retrieved December 4, 2023, from https://attri.ai/blog/a-complete-guide-top-generative-ai-agents-use-cases-for-manufacturers

Park, J. S., O'Brien, J. C., Cai, C. J., Morris, M. R., Liang, P., & Bernstein, M. S. (2023). Generative Agents: Interactive Simulacra of Human Behavior. *ArXiv:2304.03442 [Cs]*. https://arxiv.org/abs/2304.03442

What is generative AI and what are its applications? (n.d.). Google Cloud. https://cloud.google.com/use-cases/generative-ai

LLM - Large Language Model

Mearian, L. (2023, May 30). *What are LLMs, and how are they used in generative AI?* Computerworld. https://www.computerworld.com/article/3697649/what-are-large-language-models-and-how-are-they-used-in-generative-ai.html

What is a Large Language Model (LLM). (2023, June 4). GeeksforGeeks. https://www.geeksforgeeks.org/large-language-model-llm/

Unveiling the Power of Large Language Models (LLMs). (n.d.). Www.unite.ai. https://www.unite.ai/large-language-models/

Friedland, A. (2023, May 12). *What Are Generative AI, Large Language Models, and Foundation Models?* Center for Security and Emerging Technology. https://cset.georgetown.edu/article/what-are-generative-ai-large-language-models-and-foundation-models/

Lee, A. (2023, January 26). *What Are Large Language Models Used For and Why Are They Important?* NVIDIA Blog. https://blogs.nvidia.com/blog/2023/01/26/what-are-large-language-models-used-for/

Artificial Intelligence (AI) algorithms - 1 of 2

Artificial intelligence (AI) algorithms: a complete overview. (n.d.). Tableau. https://www.tableau.com/data-insights/ai/algorithms

Gonfalonieri, A. (2019, April 22). *What is an AI Algorithm?* Medium. https://medium.com/predict/what-is-an-ai-algorithm-aceeab80e7e3

Coursera. (2023, July 28). *What is Artificial Intelligence? Definition, Uses, and Types*. Coursera. https://www.coursera.org/articles/what-is-artificial-intelligence

The hallucination problem in AI

Gungor, A. (2023, March 22). *ChatGPT: What Are Hallucinations And Why Are They A Problem For AI Systems*. Bernard Marr. https://bernardmarr.com/chatgpt-what-are-hallucinations-and-why-are-they-a-problem-for-ai-systems/

Simonite, T. (2018, March 9). *AI Has a Hallucination Problem That's Proving Tough to Fix*. Wired; WIRED. https://www.wired.com/story/ai-has-a-hallucination-problem-thats-proving-tough-to-fix/

Stopping AI Hallucinations in Their Tracks. (2023, April 6). Appen. https://appen.com/blog/stopping-ai-hallucinations-in-their-tracks/

News, A. B. C. (2023, August 1). *Chatbots sometimes make things up. Is AI's hallucination problem fixable?* ABC News. https://abcnews.go.com/US/wireStory/chatbots-make-things-thinks-ais-hallucination-problem-fixable-101890920

Prompt engineering - 1 of 2

McKinsey & Company. (2023, June). *The economic potential of generative AI - The next productivity frontier* (McKinsey & Company, Ed.) [Review of *The economic potential of generative AI - The next productivity frontier*]. McKinsey & Company. www.mckinsey.com

Prompt engineering - 2 of 2

Prompt Engineering for Generative AI | Machine Learning. (n.d.). Google for Developers. https://developers.google.com/machine-learning/resources/prompt-eng

Zia, Dr. T. (2022, August 24). *Prompt Learning: A New Way to Train Foundation Models in AI* [Review of *Prompt Learning: A New Way to Train Foundation Models in AI*]. Techopedia; www.techopedia.com. https://www.techopedia.com/prompt-learning-a-new-way-to-train-foundation-models-in-ai/2/34793

K, A. (2023, August 30). *Prompt Engineering: What It Is and 15 Techniques for Effective AI Prompting + Tips*. Hostinger Tutorials. https://www.hostinger.in/tutorials/ai-prompt-engineering

What Is Prompt Engineering? Definition and Examples. (2023, October 13). Coursera. https://www.coursera.org/articles/what-is-prompt-engineering

John. (2023, February 12). *A Beginner's Guide to Prompt Engineering in AI*. Digital Purview. https://digitalpurview.com/prompt-engineering-ai/

What is Prompt Engineering? Explained. (2023, April 26). HackerRank Blog. https://www.hackerrank.com/blog/what-is-prompt-engineering/

What is Prompt Engineering? (2023, March 6). Prompt Engineering. https://promptengineering.org/what-is-prompt-engineering/

AI virtual assistant

What is an AI Virtual Assistant? (n.d.). Synoptek. Retrieved December 5, 2023, from https://synoptek.com/insights/it-blogs/ai-virtual-assistant/

Definition of Virtual Assistant (VA) - Gartner Information Technology Glossary. (n.d.). Gartner. https://www.gartner.com/en/information-technology/glossary/virtual-assistant-va

The Beginner's Guide to AI Virtual Assistants - SmartKarrot Blog. (n.d.). Www.smartkarrot.com. Retrieved December 5, 2023, from https://www.smartkarrot.com/resources/blog/ai-virtual-assistant/

Chatbot

define chatbot. (n.d.). Bing. Retrieved December 5, 2023, from https://bing.com/search?q=define+chatbot

IBM. (2023). *What is a chatbot? | IBM*. Www.ibm.com. https://www.ibm.com/topics/chatbots

What is a Chatbot? - Definition from Techopedia. (n.d.). Techopedia.com. https://www.techopedia.com/definition/16366/chatterbot

chatbot. (n.d.). Dictionary.cambridge.org. https://dictionary.cambridge.org/dictionary/english/chatbot

Oxford Languages | The Home of Language Data. (2019). Oxforddictionaries.com. http://www.oxforddictionaries.com/

Multimodal Chatbot

Lab, N. (2020, July 17). *What Is a Multimodal Humanoid Companion for Customer Services: Chatbot — Virtual Assistant — Avatar…*. Medium. https://medium.com/@neurodatalab/what-is-a-multimodal-humanoid-

companion-for-customer-services-chatbot-virtual-assistant-avatar-92810358dad2
Rouse, M. (2023, July 4). *Multimodal AI (Multimodal Artificial Intelligence)* [Review of *Multimodal AI (Multimodal Artificial Intelligence)*]. Techopedia; Techopedia. https://www.techopedia.com/definition/multimodal-ai-multimodal-artificial-intelligence
Xu, N. (n.d.). *Multimodal Chatbots*. https://web.stanford.edu/class/cs294s/slides/project_pitch_multimodal_chatbots-cs294s-2020fall.pdf
K.sabreena. (2023, June 26). *AI Can Now See & Listen: Welcome to the World of Multimodal AI*. Analytics Vidhya. https://www.analyticsvidhya.com/blog/2023/06/openais-multimodal-ai-can-see-hear/
Global, M. O. C. (2022, July 29). *Multimodal Conversational AI assistants*. Medium. https://chatbotslife.com/multimodal-conversational-ai-assistants-864de02bee8d

Multimodal chatbots definition. (n.d.). Bing. Retrieved December 5, 2023, from https://bing.com/search?q=Multimodal+chatbots+definition
Lee, M. (2023). *Building Multimodal AI Chatbots*. https://arxiv.org/pdf/2305.03512.pdf
Multi-Modal Chatbot in Intelligent Manufacturing | IEEE Journals & Magazine | IEEE Xplore. (n.d.). Ieeexplore.ieee.org. Retrieved December 5, 2023, from https://ieeexplore.ieee.org/document/9440470

Unimodal Chatbots

Rouse, M. (2023, July 4). *Multimodal AI (Multimodal Artificial Intelligence)* [Review of *Multimodal AI (Multimodal Artificial Intelligence)*]. Techopedia; Techopedia. https://www.techopedia.com/definition/multimodal-ai-multimodal-artificial-intelligence
How To Build an AI Chatbot Like ChatGPT? (2023, March 17). https://www.appventurez.com/blog/build-an-ai-chatbot-like-chatgpt
FRANKENFIELD, J. (2019). *Chatbot*. Investopedia. https://www.investopedia.com/terms/c/chatbot.asp
Unimodal chatbots definition. (n.d.). Bing. Retrieved December 5, 2023, from https://bing.com/search?q=Unimodal+chatbots+definition

Mejia, N. (2019, December 13). *What Are Chatbots? - An Informed Definition With Use-Cases*. Emerj Artificial Intelligence Research. https://emerj.com/ai-glossary-terms/what-are-chatbots/

IBM. (2023). *What is a chatbot? | IBM*. Www.ibm.com. https://www.ibm.com/topics/chatbots

Definition of Chatbot - Gartner Information Technology Glossary. (n.d.). Gartner. https://www.gartner.com/en/information-technology/glossary/chatbot

Omnichannel Chatbot

Capacity, T. (n.d.). *Why Every Business Needs an Omnichannel Chatbot Strategy*. Capacity. Retrieved December 5, 2023, from https://capacity.com/learn/ai-chatbots/omnichannel-chatbot/

Omnichannel Chatbots: Working, Benefits and Best Practices. (n.d.). Botpenguin.com. Retrieved December 5, 2023, from https://botpenguin.com/glossary/omnichannel-chatbot

Omnichannel chatbots definition. (n.d.). Bing. Retrieved December 5, 2023, from https://bing.com/search?q=Omnichannel+chatbots+definition

The Role of Chatbots in the Omnichannel Experience. (n.d.). Www.juniperresearch.com. https://www.juniperresearch.com/blog/march-2022/the-role-of-chatbots-in-the-omnichannel-experience

Amplifying Customer Support With An Omnichannel Chatbot. (2021, August 30). Verloop.io. https://verloop.io/blog/customer-support-omnichannel-chatbot/

What is Omnichannel? Omnichannel Definition and Overview. (n.d.). Www.outsystems.com. https://www.outsystems.com/glossary/what-is-omnichannel/

Shanbhag, A. (2020, October 19). *Transforming Omnichannel Customer Service With Chatbots*. BotCore. https://botcore.ai/blog/omnichannel-customer-service-chatbots/

Graphics processing units (GPUs)

McKinsey & Company. (2023, June). *The economic potential of generative AI - The next productivity frontier* (McKinsey & Company, Ed.) [Review of *The economic potential of generative AI - The next productivity frontier*]. McKinsey & Company. www.mckinsey.com

Facial analysis

Facial Expression Analysis: What it is and how it works. (2022, August 18). https://imotions.com/blog/learning/research-fundamentals/facial-expression/

Beauty AR Company and Makeup AR Technology Platform. (n.d.). Www.perfectcorp.com. Retrieved December 5, 2023, from https://www.perfectcorp.com/business/showcase/face-analyzer

AlgoFace. (2021, July 13). *Face Recognition vs. Face Analysis: What's the Difference?* AlgoFace. https://www.algoface.ai/face-recognition-vs-face-analysis-whats-the-difference/

TEST, T. (2023, August 29). *4 Steps for Estheticians to Do a Skin Analysis*. Canta Beauty. https://cantabeauty.com/blog/4-steps-for-estheticians-to-do-a-skin-analysis/

Computer vision

IBM. (n.d.). *Computer Vision*. IBM. https://www.ibm.com/topics/computer-vision

Computer Vision. (2019, May 17). DeepAI. https://deepai.org/machine-learning-glossary-and-terms/computer-vision

What is Computer Vision? - Definition from Techopedia. (2019). Techopedia.com. https://www.techopedia.com/definition/32309/computer-vision

What Is Computer Vision? (Definition, Examples, Uses) | Built In. (n.d.). Builtin.com. https://builtin.com/machine-learning/computer-vision

City street crossing through eyes of AI computer vision &... (n.d.). Getty Images. Retrieved December 5, 2023, from https://www.gettyimages.com/detail/illustration/city-street-crossing-through-eyes-of-ai-royalty-free-illustration/1185122589

GDPR

Wolford, B. (2023). *What Is GDPR, the EU's New Data Protection law?* GDPR.eu; European Union. https://gdpr.eu/what-is-gdpr/

Personalized advertising

Personalized Ads: A Guide to Personalization without Cookies | IBM Watson Advertising. (n.d.). Www.ibm.com. https://www.ibm.com/watson-advertising/thought-leadership/personalized-ads-guide-without-cookies

Cognitive advertising

An Introduction to Cognitive Advertising | IBM Watson Advertising Thought Leadership. (n.d.). Www.ibm.com. https://www.ibm.com/watson-advertising/thought-leadership/an-introduction-to-cognitive-advertising

Contextual advertising

What is contextual advertising? Everything you need to know | IBM Watson Advertising Thought Leadership. (n.d.). Www.ibm.com. https://www.ibm.com/watson-advertising/thought-leadership/what-is-contextual-advertising

First-party cookie

What is a First-Party Cookie? (n.d.). CookiePro. https://www.cookiepro.com/knowledge/what-is-a-first-party-cookie/

What are first-party cookies? (n.d.). IONOS Digital Guide. https://www.ionos.com/digitalguide/hosting/technical-matters/what-are-first-party-cookies/

Castillo, D. (2022, July 26). *What are first-party cookies and how can you use them effectively?* Lytics Customer Data Platform (CDP). https://www.lytics.com/blog/what-are-first-party-cookies-and-how-can-you-use-them-effectively/

Lane, P. (2022, February 4). *First-Party Cookies vs. Third-Party Cookies (Biggest Differences)*. Terakeet. https://terakeet.com/blog/first-party-cookies-vs-third-party-cookies/

Second-party cookie

Gosewisch, B. (2021, February 9). *What are first, second and third party cookies?* Bas Gosewisch. https://basgosewisch.com/first-second-and-third-party-cookies-what-it-all-means/

Breaking down first, second and third-party cookies. (n.d.). Www.thoughtleaders.io. Retrieved December 5, 2023, from https://www.thoughtleaders.io/blog/breaking-down-first-second-and-third-party-cookies

Wlosik, M. (2018, November 2). *First-Party & Third-Party Cookies: What's the Difference? - Clearcode Blog*. Clearcode | Custom AdTech and MarTech Development. https://clearcode.cc/blog/difference-between-first-party-third-party-cookies/

Regarding third-party cookies, who is a "second party"? (n.d.). Stack Overflow. Retrieved December 5, 2023, from https://stackoverflow.com/questions/71325236/regarding-third-party-cookies-who-is-a-second-party

Second-Party Cookie Definition - Glossary - CDP.com. (2022, March 15). https://cdp.com/glossary/second-party-cookie/

Third-party cookie (3PC)

Third-party cookies: What are they and how do they work? | Norton. (n.d.). Us.norton.com. https://us.norton.com/blog/privacy/internet-privacy-third-party-cookies

What is a Third-Party Cookie? (n.d.). CookiePro. https://www.cookiepro.com/knowledge/what-is-a-third-party-cookie/

Komnenic, M. (2022, March 16). *First-Party vs. Third-Party Cookies: The Differences Explained*. Termly. https://termly.io/resources/articles/first-party-cookies-vs-third-party-cookies/

What are third-party cookies? (n.d.). IONOS Digitalguide. https://www.ionos.com/digitalguide/hosting/technical-matters/what-are-third-party-cookies/

Guide to Third-party Cookies. (2021, September 20). CookieYes. https://www.cookieyes.com/blog/third-party-cookies/

The cookie apocalypse - 1 of 3

PublicisSapient. (n.d.). *Cookie Apocalypse | Publicis Sapient*. Www.publicissapient.com. Retrieved December 5, 2023, from https://www.publicissapient.com/insights/cookie-apocalypse

Duncan, K. (2020, December 29). *How to Survive the Google Cookie Apocalypse in 2022*. The Copy Cartel. https://www.thecopycartel.com/how-to-survive-googles-cookie-apocalypse-in-2022/

Survive Third-Party Cookie Loss. (n.d.). Tealium. Retrieved December 5, 2023, from https://tealium.com/cookie-apocalypse/

What is the "Cookie Apocalypse," and How Can Marketers Survive It? (n.d.). Inbound.six.marketing. Retrieved December 5, 2023, from https://inbound.six.marketing/blog/what-is-the-cookie-apocalypse

What is the "Cookie Apocalypse?" (2022, April 12). Crystalbox.ai. https://crystalbox.ai/news/2022/04/what-is-the-cookie-apocalypse/

The cookie apocalypse - 3 of 3

The Demise of Third-Party Cookies |Cookie Apocalypse. (n.d.). Www.framen.com. Retrieved December 5, 2023, from https://www.framen.com/blog/the-cookie-apocalypse

Conversion metrics, Conversion rate, Cost per acquisition (CPA), Customer acquisition cost (CAC), Click-through rate (CTR), Bounce rate, Website sessions, Pages per session

ROAS (Return On Ad Spend)

Shieldsmith, J. (n.d.). *The 9 Most Important Conversion Metrics to Track (+Tips!)*. LocaliQ. https://localiq.com/blog/conversion-metrics/

8 Key Conversion Rate Metrics You Need to Measure, Calculate, Optimize. (n.d.). https://Www.insightsforprofessionals.com. Retrieved December 5, 2023, from https://www.insightsforprofessionals.com/marketing/leadership/conversion-rate-metrics-you-should-measure

What is a conversion in digital marketing? | DMM. (n.d.). Www.digitalmediametrics.com. https://www.digitalmediametrics.com/performance/conversion

March 1, M. G. on, & Read, 2022 ~ 6 M. to. (2022, March 1). *7 Most Useful Conversion Rate Metrics to Track*. WebFX. https://www.webfx.com/blog/marketing/conversion-rate-metrics/

Google. (2019). *Clickthrough rate (CTR): Definition - Google Ads Help*. Google.com. https://support.google.com/google-ads/answer/2615875?hl=en

Hayes, A. (2022, December 22). *How the Click-Through Rate (CTR) Works*. Investopedia. https://www.investopedia.com/terms/c/clickthroughrates.asp

Click-Through Rate (CTR). (n.d.). Corporate Finance Institute. https://corporatefinanceinstitute.com/resources/valuation/click-through-rate-ctr/

ACOS (Advertising Cost of Sales)

What is advertising cost of sales (ACOS)? Here's everything you should know. (n.d.). Amazon Ads. https://advertising.amazon.com/library/guides/acos-advertising-cost-of-sales

Digital Footprint

digital footprint definition. (n.d.). Bing. Retrieved December 5, 2023, from https://bing.com/search?q=digital+footprint+definition

What is a digital footprint? And how to protect it from hackers. (2021, September 21). Kaspersky. https://www.kaspersky.com/resource-center/definitions/what-is-a-digital-footprint

Reyes, N. (2021, January 23). *What Is a Digital footprint?* Blog.reputationx.com. https://blog.reputationx.com/digital-footprint

Reyes, N. (2021, January 23). *What Is a Digital footprint?* Blog.reputationx.com. https://blog.reputationx.com/digital-footprint

What is a digital footprint? | IBM. (n.d.). Www.ibm.com. https://www.ibm.com/topics/digital-footprint

Oxford Languages | The Home of Language Data. (2019). Oxforddictionaries.com. http://www.oxforddictionaries.com/

Artificial neural networks (ANNs)

McKinsey & Company. (2023, June). *The economic potential of generative AI - The next productivity frontier* (McKinsey & Company, Ed.) [Review of *The economic potential of generative AI - The next productivity frontier*]. McKinsey & Company. www.mckinsey.com

Programmatic advertising

What Is Programmatic Advertising? | IBM Watson Advertising Thought Leadership. (n.d.). Www.ibm.com. https://www.ibm.com/watson-advertising/thought-leadership/what-is-programmatic-advertising

A beginner's guide to programmatic advertising. (n.d.). Amazon Ads. https://advertising.amazon.com/blog/programmatic-advertising

What Is Programmatic Advertising? Definition, Types, Channel, and Advantages. (n.d.). Spiceworks. https://www.spiceworks.com/marketing/programmatic-advertising/articles/what-is-programmatic-advertising/

Supply-Side Platform (SSP)

What is an SSP? Supply Side Platform explained. (n.d.). Amazon Ads. https://advertising.amazon.com/library/guides/supply-side-platform

What is an SSP? Supply-Side Platforms Explained. (2021, August 30). Ad Tech Explained. https://adtechexplained.com/ssp-explained/

DSP Vs. SSP: Understanding Key Differences. (n.d.). Www.eskimi.com. https://www.eskimi.com/blog/dsp-vs-ssp

Understanding the Programmatic Buying Ecosystem: Ad Exchanges, SSPs, and DSPs. (n.d.). Growthchannel.io. Retrieved December 5, 2023, from https://growthchannel.io/blog/understanding-the-programmatic-buying-ecosystem-ad-exchanges-ssps-and-dsps

Demand-Side Platform (DSP)

SmartyAds. (n.d.). *13 DSP Companies to Pay Attention to in 2023 - SmartyAds*. Smartyads.com. Retrieved December 5, 2023, from https://smartyads.com/blog/10-best-dsps-that-define-programmatic-buying/

ashish. (2021, August 25). *Programmatic Advertising: Your Guide to DMPs, DSPs, and SSPs*. Growth Marketing Genie. https://growthmarketinggenie.com/blog/programmatic-advertising-dmps-dsps-ssps/

Genie, G. M. (n.d.). *Programmatic Advertising: What Are DSPs, SSPs and DMPs?* Www.gamemarketinggenie.com. Retrieved December 5, 2023, from https://www.gamemarketinggenie.com/blog/what-are-dsps-ssps-dmps

Ad Exchange - 1 of 2

Karpenkova, A. (2020, April 6). *Programmatic Advertising Explained. DSP, SSP, and Ad Exchanges*. Joinative. https://joinative.com/programmatic-advertising-explained

What Is an Ad Exchange: Definition and Benefits. (n.d.). Adjoe. Retrieved December 5, 2023, from https://adjoe.io/glossary/what-is-an-ad-exchange

Programmatic Business Model: Ad Network vs. Ad Exchange. (2020, October 16). Admixer.Blog. https://blog.admixer.com/ad-network-vs-ad-exchange/

Understanding the Programmatic Buying Ecosystem: Ad Exchanges, SSPs, and DSPs. (n.d.). Growthchannel.io. Retrieved December 5, 2023, from https://growthchannel.io/blog/understanding-the-programmatic-buying-ecosystem-ad-exchanges-ssps-and-dsps

Ad exchange - 2 of 2

A beginner's guide to programmatic advertising. (n.d.). Amazon Ads. https://advertising.amazon.com/blog/programmatic-advertising

Real Time Bidding (RTB)

What is RTB? Real time bidding explained. (n.d.). Amazon Ads. https://advertising.amazon.com/library/guides/real-time-bidding

Team, A. (2020, May 29). *What Is Real-time Bidding (RTB) and What Does it Stand for in Advertising?* Adsterra Affiliate Marketing and Traffic Monetization Blog. https://adsterra.com/blog/what-is-rtb-and-how-does-it-work/

Real Time Bidding (RTB) - Authorized Buyers Help. (n.d.). Support.google.com. Retrieved December 5, 2023, from https://support.google.com/authorizedbuyers/answer/2961280?hl=en

What is Real-Time Bidding (RTB)? (n.d.). Setupad.com. Retrieved December 5, 2023, from https://setupad.com/blog/real-time-bidding/

Header Bidding

What is Header Bidding? How Header Bidding Improves on RTB. (n.d.). Www.adbutler.com. Retrieved December 5, 2023, from https://www.adbutler.com/blog/article/what-is-header-bidding

team, H. (2020, August 13). *Header Bidding Vs Real-time Bidding (RTB) - What Publishers Need to Know*. Headerbidding.co. https://headerbidding.co/header-bidding-vs-rtb/

Kapil. (2023, February 28). *Difference: Header Bidding vs RTB*. Video Advertising and Monetization Solutions | Aniview. https://aniview.com/header-bidding-vs-rtb-know-the-difference/

EmodoInc. (2023, May 11). *Guide to Real-Time Bidding (RTB) and How It Works*. Emodo. https://www.emodoinc.com/blog/real-time-bidding-rtb/

Private Marketplaces

Kim, C. (2018, February 1). *What's a Private Marketplace in Programmatic | PMPs Explained | Centro*. Basis Technologies. https://basis.com/blog/guide-to-private-marketplaces/

Rtb Private Marketplaces | Media Inventory | Programmatic Advertising. (n.d.). AudienceGPS. Retrieved December 5, 2023, from https://www.audiencegps.com/programmatic-advertising-solutions/media-inventory/rtb-private-marketplaces/

The App Marketer's Guide to Real-Time Bidding | Moloco. (n.d.). Www.moloco.com. Retrieved December 5, 2023, from https://www.moloco.com/blog/mobile-rtb

Zawadziński, M. (2018, April 13). *Understanding RTB, Programmatic Direct, and PMP - Clearcode Blog*. Clearcode | Custom AdTech and MarTech Development. https://clearcode.cc/blog/rtb-programmatic-direct-pmp/

Programmatic Direct

A Complete Guide to Programmatic Direct | Publift. (n.d.). Www.publift.com. Retrieved December 5, 2023, from https://www.publift.com/blog/what-is-programmatic-direct

blogtaboola, & Matityahu, O. B. (2022, April 1). *Guaranteed, PMP and Direct: Types of Programmatic Advertising Deals Explained*. Taboola Blog. https://blog.taboola.com/types-of-programmatic-advertising-deals/

Programmatic Advertising vs Direct Media Buying: Differences Explained. (n.d.). Www.adbutler.com. Retrieved December 5, 2023, from https://www.adbutler.com/blog/article/Programmatic-Advertising-vs-Direct-Media-Buying-Differences-Explained

Programmatic Guaranteed

Real-time Bidding differences for Programmatic Guaranteed Deals - Authorized Buyers Help. (n.d.). Support.google.com. Retrieved December 5, 2023, from https://support.google.com/authorizedbuyers/answer/7174589?hl=en

What Is Programmatic Guaranteed? How It Works & Why Use It. (n.d.). Www.eskimi.com. Retrieved December 5, 2023, from https://www.eskimi.com/blog/programmatic-guaranteed

The Nuts and Bolts of Real-Time Bidding. (n.d.). Epom.com. https://epom.com/blog/programmatic/what-is-real-time-bidding

blogtaboola, & Matityahu, O. B. (2022, April 1). *Guaranteed, PMP and Direct: Types of Programmatic Advertising Deals Explained*. Taboola Blog. https://blog.taboola.com/types-of-programmatic-advertising-deals/

Native Advertising

define native advertising. (n.d.). Bing. Retrieved December 5, 2023, from https://bing.com/search?q=define+native+advertising

Outbrain. (2019). *Outbrain -What Is Native Advertising- How it works?* Outbrain. https://www.outbrain.com/native-advertising/

What is native advertising? (n.d.). Microsoft Advertising. https://about.ads.microsoft.com/en-us/blog/post/april-2021/what-is-native-advertising

Wikipedia Contributors. (2019, March 4). *Native advertising*. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Native_advertising

Oxford Languages | The Home of Language Data. (2019). Oxforddictionaries.com. http://www.oxforddictionaries.com/

Native Spend

SmartyAds. (n.d.). *Complete Guide to Programmatic Native Advertising in 2023 - SmartyAds*. Smartyads.com. Retrieved December 5, 2023, from https://smartyads.com/blog/programmatic-native-advertising/

benjamin, michel. (2019, October 2). *Understanding Programmatic Advertising: RTB, DSP, SSP, and Trading Desks Defined*. AX Insights. https://audiencex.com/insights/understanding-programmatic-advertising/

What is programmatic advertising? | Publift. (n.d.). Www.publift.com. https://www.publift.com/adteach/what-is-programmatic-advertising

Programmatic Ads 101: The Plain-English Guide to Programmatic Advertising. (2021, March 18). Blog.hubspot.com. https://blog.hubspot.com/agency/programmatic-advertising-glossary

Frequency capping

Set Google-hosted frequency caps for RTB bids - Authorized Buyers Help. (n.d.). Support.google.com. Retrieved December 5, 2023, from https://support.google.com/authorizedbuyers/answer/10890762?hl=en

Exploring Optimal Frequency Caps in Real Time Bidding Advertising | IEEE Conference Publication | IEEE Xplore. (n.d.). Ieeexplore.ieee.org. Retrieved December 5, 2023, from https://ieeexplore.ieee.org/document/7723718/

Calandro, F. (2023, May 24). *Frequency in Advertising: How to Use It to Maximize Ad Effectiveness*. Gnet RTB. https://gnetrtb.com/frequency-in-advertising/

(2023). Ieee.org. https://ieeexplore.ieee.org/servlet/opac?punumber=7636704

Bid forecasting

Wang, Y., Ren, K., Zhang, W., Wang, J., & Yu, Y. (2016). Functional Bid Landscape Forecasting for Display Advertising. *Lecture Notes in Computer Science*, 115–131. https://doi.org/10.1007/978-3-319-46128-1_8

Graham, K. (2017, September 21). *Real Time Bidding (RTB) Explained - Programmatic Buying, Platforms, Ads & Networks Guide For...* MonetizeMore; MonetizeMore. https://www.monetizemore.com/blog/real-time-bidding-rtb-explained/

Team, A. (2020, May 29). *What Is Real-time Bidding (RTB) and What Does it Stand for in Advertising?* Adsterra Affiliate Marketing and Traffic Monetization Blog. https://adsterra.com/blog/what-is-rtb-and-how-does-it-work/

Khloyan, S. (n.d.). *What is Real-time Bidding (RTB)? How does it work?* Www.aarki.com. Retrieved December 6, 2023, from https://www.aarki.com/insights/what-is-real-time-bidding-rtb-how-does-it-work

What is real time bidding (RTB) - definition | Blog OnAudience.com. (2019, March 22). On Audience. https://www.onaudience.com/resources/what-is-real-time-bidding-rtb-definition/

Infographic: Everything You Need To Know About Real Time Bidding For Display Ads. (2014, May 8). Marketing Land. http://marketingland.com/infographic-real-time-bidding-83186

Ad verification services

Davis, B. (2016, January 29). *What are the advantages of RTB for buying display advertising?* [Review of *What are the advantages of RTB for buying display advertising?*]. Econsultancy; Econsultancy. https://econsultancy.com/what-are-the-advantages-of-rtb-for-buying-display-advertising/

What is Ad Verification & How Does It Work? (n.d.). GeoEdge. Retrieved December 6, 2023, from https://www.geoedge.com/university/what-is-ad-verification/

What is Ad Verification & How Does It Work? (n.d.). GeoEdge. Retrieved December 6, 2023, from https://www.geoedge.com/university/what-is-ad-verification/

AdKernel. (2019, May 29). *AdKernel Integrates Fraudlogix's Ad Verification Technology Directly into RTB Platform To Improve Advertisers' Fraud Management Capabilities*. ACCESSWIRE News Room. https://www.accesswire.com/547095/AdKernel-Integrates-Fraudlogixs-Ad-Verification-Technology-Directly-into-RTB-Platform-To-Improve-Advertisers-Fraud-Management-Capabilities

Graham, K. (2017, September 21). *Real Time Bidding (RTB) Explained - Programmatic Buying, Platforms, Ads & Networks Guide For...* MonetizeMore; MonetizeMore. https://www.monetizemore.com/blog/real-time-bidding-rtb-explained/

What is RTB? How the RTB process works in advertising. (n.d.). Www.adbutler.com. Retrieved December 6, 2023, from https://www.adbutler.com/blog/article/what-is-rtb-how-the-rtb-process-works-in-advertising

Infographic: Everything You Need To Know About Real Time Bidding For Display Ads. (2014, May 8). Marketing Land. http://marketingland.com/infographic-real-time-bidding-83186

Digital Out-Of-Home

What is DOOH media? (n.d.). Broadsign. https://broadsign.com/blog/what-is-dooh-media/

What is Digital Out-Of-Home (DOOH) Advertising? Definition, Advantages, Programmatic Approach, Trends and Examples. (n.d.). Spiceworks. https://www.spiceworks.com/marketing/programmatic-advertising/articles/what-is-digital-out-of-home-dooh/

MasterClass. (2022, March 22). *OOH Advertising: 4 Examples of Out-of-Home Advertising* (MasterClass, Ed.) [Review of *OOH Advertising: 4 Examples of Out-of-Home Advertising*]. MasterClass; MasterClass. https://www.masterclass.com/articles/ooh-advertising

What Does DOOH Mean? (2020, June 3). Out of Home Advertising Blog - AdQuick. https://blog.adquick.com/blog/what-does-dooh-mean/

BOT

define a bot. (n.d.). Bing. Retrieved December 6, 2023, from https://bing.com/search?q=define+a+bot

What Is a Bot? | Bot Definition | Cloudflare. (n.d.). *Cloudflare*. https://www.cloudflare.com/learning/bots/what-is-a-bot/

Definition of BOT. (2020). Merriam-Webster.com. https://www.merriam-webster.com/dictionary/bot

Bot. (2014). Techterms.com. https://techterms.com/definition/bot

Oxford Languages | The Home of Language Data. (2019). Oxforddictionaries.com. http://www.oxforddictionaries.com/

Augmented reality (AR)

define Augmented Reality. (n.d.). Bing. Retrieved December 6, 2023, from https://bing.com/search?q=define+Augmented+Reality

Hayes, A. (2023, May 15). *Augmented Reality (AR) Defined, with Examples and Uses*. Investopedia. https://www.investopedia.com/terms/a/augmented-reality.asp

Wikipedia Contributors. (2018, December 18). *Augmented reality*. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Augmented_reality

Merriam-Webster. (2018). *Definition of AUGMENTED REALITY*. Merriam-Webster.com. https://www.merriam-webster.com/dictionary/augmented%20reality

Oxford Languages | The Home of Language Data. (2019). Oxforddictionaries.com. http://www.oxforddictionaries.com/

Virtual Reality (VR)

Lowood, H. E. (2018). Virtual reality | computer science. In *Encyclopædia Britannica*. https://www.britannica.com/technology/virtual-reality

define Virtual Reality. (n.d.). Bing. Retrieved December 6, 2023, from https://bing.com/search?q=define+Virtual+Reality

Virtual Reality Society. (2017). *What is Virtual Reality? - Virtual Reality Society*. Virtual Reality Society. https://www.vrs.org.uk/virtual-reality/what-is-virtual-reality.html

Merriam-Webster. (2019). *Definition of VIRTUAL REALITY*. Merriam-Webster.com. https://www.merriam-webster.com/dictionary/virtual%20reality

Oxford Languages | The Home of Language Data. (2019). Oxforddictionaries.com. http://www.oxforddictionaries.com/

Handsome men with glasses of virtual reality. Future gadgets... (n.d.). Getty Images. Retrieved December 6, 2023, from https://www.gettyimages.com/detail/photo/young-man-experiencing-virtual-reality-eyeglasses-royalty-free-image/1135085068

Hyper-Personalization

McFadden, C. (2023, April 26). *AI hyper-personalization: A revolutionary approach to tailor customer experience*. Interestingengineering.com. https://interestingengineering.com/culture/the-future-is-hyperpersonaization

Maayan, G. D. (2020, March 12). *AI-Based Hyper Personalization: A Primer*. DATAVERSITY. https://www.dataversity.net/ai-based-hyper-personalization-a-primer/

Definition of Hyper-Personalization? | Syte. (n.d.). Syte | the World's #1 Product Discovery Platform for ECommerce. https://www.syte.ai/glossary/hyper-personalization/

What is Hyper-Personalization? Future of Customer Experience - Acquire. (n.d.). Acquire.io. https://acquire.io/blog/hyper-personalization

Attribution Models

Collaborators, Q. (2023, June 29). *Attribution Models: Types + How To Choose the Right Model*. QuestionPro. https://www.questionpro.com/blog/attribution-models/

What is an attribution model? - Why is attribution model important? (n.d.). Www.oberlo.com. Retrieved December 6, 2023, from https://www.oberlo.com/ecommerce-wiki/attribution-model

Baker, K. (n.d.). *What Is Attribution Modeling and Why It's So Important*. Blog.hubspot.com. https://blog.hubspot.com/marketing/attribution-modeling

Editor, C. (2023, April 24). *What is Attribution Modeling In Marketing: Types of Models*. CodeFuel. https://www.codefuel.com/blog/attribution-modelling/

A beginners' guide to attribution modelling. (n.d.). The Drum. https://www.thedrum.com/opinion/2014/09/24/beginners-guide-attribution-modelling

Deepfakes

Wikipedia Contributors. (2019, May 17). *Deepfake*. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Deepfake

Deepfakes definition. (n.d.). Bing. Retrieved December 6, 2023, from https://bing.com/search?q=Deepfakes+definition

Merriam-Webster. (n.d.). *Definition of DEEPFAKE*. Www.merriam-Webster.com. https://www.merriam-webster.com/dictionary/deepfake

Somers, M. (2020, July 21). *Deepfakes, explained*. MIT Sloan. https://mitsloan.mit.edu/ideas-made-to-matter/deepfakes-explained

Oxford Languages | The Home of Language Data. (2019). Oxforddictionaries.com. http://www.oxforddictionaries.com/

Deep fake or deepfake technology as AI or artificial intelligence as... (n.d.). Getty Images. Retrieved December 6, 2023, from https://www.gettyimages.com/detail/photo/deep-fake-royalty-free-image/1174925872

The alignment problem

The Alignment Problem. (2023, February 12). Wikipedia. https://en.wikipedia.org/wiki/The_Alignment_Problem

Cracking the Alignment Problem in AI: How does ChatGPT respond to Controversial Prompts. (2023, April 6). Nanonets Intelligent Automation, and Business Process AI Blog. https://nanonets.com/blog/cracking-the-alignment-problem-in-ai/

Ngo, R., Chan, L., & Mindermann, S. (2023). The alignment problem from a deep learning perspective. *ArXiv:2209.00626 [Cs]*. https://arxiv.org/abs/2209.00626

Goodhart's law

Wikipedia Contributors. (2019, September 22). *Goodhart's law*. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Goodhart%27s_law

Blog, F. (n.d.). *Goodhart's Law: Definition, Implications & Examples*. Www.formpl.us. Retrieved December 6, 2023, from https://www.formpl.us/blog/goodharts-law

Johnson, J. (n.d.). *What Is Goodhart's Law? Balancing Authenticity & Measurement*. BMC Blogs. https://www.bmc.com/blogs/goodharts-law/

Moore's law

Wikipedia Contributors. (2019, May 12). *Moore*. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Moore

Tardi, C. (2021, February 24). *What Is Moore's Law and Is It Still True?* Investopedia. https://www.investopedia.com/terms/m/mooreslaw.asp

Roser, M., Ritchie, H., & Mathieu, E. (2023, March 28). *What is Moore's Law?* Our World in Data. https://ourworldindata.org/moores-law

Wikipedia Contributors. (2019, May 12). *Moore*. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Moore

Word Moore's law written in bold white letters on blue reflective... (n.d.). Getty Images. Retrieved December 6, 2023, from https://www.gettyimages.com/detail/photo/word-moores-law-on-blue-background-royalty-free-image/1185768329

Zettabyte - 1 of 2

zettabyte. (n.d.). Bing. Retrieved December 6, 2023, from https://bing.com/search?q=zettabyte

What Is A Zettabyte? Data Defined. (n.d.). Indicative. https://www.indicative.com/resource/zettabyte/

How big is a Petabyte, Exabyte, Zettabyte, or a Yottabyte? - High Scalability -. (n.d.). Highscalability.com. http://highscalability.com/blog/2012/9/11/how-big-is-a-petabyte-exabyte-zettabyte-or-a-yottabyte.html

Zettabyte. (2022, August 14). Wikipedia. https://simple.wikipedia.org/wiki/Zettabyte

Zettabyte - 2 of 2

Zettabyte Definition - How much data is in a zettabyte? (n.d.). Techterms.com. Retrieved December 6, 2023, from https://techterms.com/definition/zettabyte

Units of measurements for data storage

What units of measurement are used for data storage? (n.d.). Techterms.com. https://techterms.com/help/data_storage_units_of_measurement