

AI definitions

Term	Definition
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Artificial intelligence (AI)	Technology that mimics human thought processes.
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Data	Elements such as measures and symbols used to create information. The different forms of data frequently are defined by: • Volume: the amount of healthcare data that needs to be stored, managed, processed, and protected • Velocity: the speed at which new data are generated • Variety: the different forms of health data collected and used • Veracity: the level of certainty or trustworthiness of the data due to inconsistency and incompleteness. “Big data” encompasses data that exceed human comprehension, exist at a <i>volume</i> unmanageable by standard computer systems, and arrive at a <i>velocity</i> not under the investigator’s control. Big data often include a <i>variety</i> of types whose <i>veracity</i> is hard to determine.
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Data science	The systematic study of the organization and use of digital data to discover new knowledge, accelerate discovery, and improve decision-making. Health data science is the study of generating data-driven solutions to complex real-world health problems, at the intersection of statistics, computer science, and healthcare.
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Predictive analytics	A type of data analysis used in data science to predict an outcome for an individual or a group. Big data provide a rich array of elements and variables to develop more comprehensive and complex predictive models for probability of disease state, health and illness status, and health trajectories.
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Term	Definition	Application examples
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Data visualization	An approach to creating knowledge from big data that uses figures, graphs, and other illustrations (e.g., bubble charts, quilt plots).	• Unit-level reports for nurse managers • Month-by-month comparisons of outcomes or finances • Interactive risk charts
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Machine learning	Machine learning is a type of AI that uses algorithms to analyze raw data and develop computer instructions to achieve objectives such as making predictions, recognizing speeches, translating text, and playing games.	• Disease (e.g., diabetes, heart disease) prediction • Early sepsis detection
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Deep learning	Deep learning is a subfield of machine learning. A deep learning model is designed to reach the same conclusions as a traditional machine learning algorithm but does so with much less human input. To achieve this, deep learning applications use a layered structure of model elements called an artificial neural network.	• Automated diagnosis from medical images (e.g., tumor recognition and staging) • Drug discovery • Disease outbreak detection • Personalized healthcare through genomics (e.g., drug therapy)
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Neural networks	Neural networks are composed of algorithms modeled after human thought processes. These networks are used to recognize patterns from large amounts of data, whether it’s alpha-numeric or images.
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Natural language processing	This machine learning field focuses on developing computer algorithms that process and analyze unstructured text or speech data.	• Diagnosis confirmation • Clinical ontology/terminology development • Automated content/qualitative analysis • Use of Twitter data to detect flu outbreaks
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Robots, robotics, and robotic process automation	Robots are programmed, in their most simple design, to perform elementary tasks by following step-by-step instructions in assembly lines and manufacturing factories. More advanced robotics can be shaped in the form of unmanned autonomous vehicles, drones, chatbots, smart assistants, or social robots.	• Food tray delivery • Patient chatbots for triage • Sanitation
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	Robotics combine hardware with intelligent software powered by data to perform a task that requires a certain level of intelligence. Such tasks include orientation, motion, interaction with other robots (machine-to-machine interaction), interaction with humans (e.g., social robots and smart assistants).
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