A brief history of artificial intelligence pdf

The intellectual roots of AI, and the concept of intelligent machines, can be found in Greek mythology. Intelligent artifacts have been appearing in literature ever since, with real (and underwater) mechanical devices actually proving they behave with a certain degree of intelligence. Some of these conceptual achievements are listed below in the section Ancient History After modern computers were available, after World War II, it is possible to create programs that perform difficult intellectual tasks. Of these programs, general tools are constructed that have applications in a wide range of everday problems. Some of these calculation milestones are listed below in modern history. The ancient history of the Greek myths of Hephaestus, the blacksmith who produced mechanical servants, and the bronze man Talos incorporate the idea of intelligent robots. Many other myths in antiquity include human-like artifacts. Many mechanical toys and models were actually built, for example, by Archytas from Tarentuma, Hero, Daedalus and other real persons. 4th century before the 4th 13th century Talking heads were said to have been created, Roger Bacon and Albert the Great supposedly among the owners. Ramon Lull, a Spanish theologian, invented machines to discover nematic lawyers through combinatorics. In a 1206 ad, Al-Jazari, an Arab inventor, designed what is believed to be the first programmable humanoid robot, a ship carrying four mechanical musicians powered by water flow. 15th century Invention of printing using a moveable type. Gutenberg Bible Printed (1456). The 15th-16th century Clock, the first modern measuring machine, was first made using lathes. In the 16th century watchmakers expanded their craft to create mechanical animals and other novelties. See, for example, DaVinci's Walking Lion (1515). Rabbi Loew from Prague apparently invented Golem, a clay man brought to life (1580). 17th century At the beginning of the century Descartes suggested that the bodies of animals are nothing more than complex machines. Many other 17th-century thinkers have been 17. Pascal created the first mechanical digital counting machine (1642). Thomas Hobbes published Leviathan (1651), containing mechanical and combining theory of thought. Arithmetic machines designed by Sir Samuel Morland between 1662 and 1666 Leibniz improved Pascal's machine to do multiplication & division with a machine called Step Reckoner (1673) and introduced a universal calculus of reasoning under which arguments could be decided mechanically. 18th century 18th century Edgar Allen Poe wrote (in the Southern Literary Messenger, April 1836) that Turks could not be a machine because, if it were, they would not have lost. 19. Joseph-Marie Jacquard invented Jacquard State, the first programmable machine, with instructions on perforated cards (1801). Luddites (Marjie Bloy, PhD. Victorian Web) (led by Ned Ludd) destroyed machines in England (1811-1816). See also what Luddites really fought against. Richard Conniff, Smithsonian magazine (March 2011). Mary Shelley published the story of frankenstein's monster (1818). Book Frankenstein, or Modern Prometheus available from Project Gutenberg. Charles Babbage & Ada Byron (Lady Lovelace) designed programmable mechanical counting machines Analytical Motor (1832). The working model was built in 2002; a short video shows that it works. George Boole developed binary algebra representing (some) laws of thought, published in Laws of Thought (1854). Modern projection logic brought out Gottlob Frege in his 1879 work Begriffsschrift and later clarified and expanded Russell, Tarski, Godel, Church and others. 20th century - The first half of Bertrand Russell and Alfred North Whitehead is published by Principia Mathematica, who revolutionized formal logic. Russell, Ludwig Wittgenstein and Rudolf Carnap lead philosophy in logical knowledge analysis. Torres y Quevedo built his chess machine 'Ajedrecista', using electromagnets under the board to play the endgame tower and king against the lone king, possibly the first computer game (1912). Charles Capek plays R.U.R. (Rossum's Universal Robots) produced in 1921 (opening London, 1923). - First use the word robot in English. Alan Turing designed the Versatile Turing Machine (1936-37) Electro, a mechanical man, introduced by Westinghouse Electric at the World's Fair in New York (1939), along with Sparko, a mechanical dog. Warren McCulloch & Walter Pitts publishes A Logical Calculus of Immanent Ideas in Neural Activity (1943), laying the groundwork for neural networks. Arturo Rosenblueth, Norbert Wiener & Julian Bigelow coin term cybernetics in a 1943 paper. Wiener's popular book under this name, published in 1948. Emil Post demonstrates that production systems are a general computing mechanism (1943). See Ch.2 of expert systems based on rules for the use of production systems in artificial agricultural production. The post also did important work on completeness, inconsistency and proof theory. George Polya published his bestselling bestselling book on thinking heuristically, How to Solve It in 1945. This book introduced the term 'heuristic' into modern thinking and influenced many AI scientists. Vannevar Bush published How Can We Think (Atlantic Monthly, July 1945) a prescient vision of a future in which computers help people in many activities. Grey Walter experimented with autonomous robots, turtles named Elsie and Elmer in Bristol (1948-1949) on the assumption that a small number of brain cells could lead to complex behaviour. A.M. Turing is published by Computing Machinery and Intelligence (1950). - Introduction of the Turing test as a way to make the smart behavior test operational. Turing Institute for More Information on Turing. Claude Shannon published a detailed analysis of chess play as a search in Computer Programming to Play Chess (1950). Isaac Asimov published his Three Laws of Robotics (1950). Modern history Modern history of AI begins with the development of stored-program electronic computers. For a short summary, see Genius and Tragedy at the Dawn of the Computer Age by Alice RAWSTHORN, NY Times (March 25, 2012), an overview of technology historian George Dyson's book Turing Cathedral: The Origins of the Digital Universe. 1956 1957Such problem solver (GPS) was introduced by Newell, Shaw & Simon. 1952-62Arthur Samuel (IBM) wrote the first game program, for a lady, to achieve sufficient skills to challenge the world champion. Samuel's machine learning programs were responsible for the high performance of the lady player. 1958John McCarthy (MIT) invented the language of Lisp. Herb Gelernter & Nathan Rochester (IBM) described the sentence prover in geometry, which uses a semantic domain model in the form of diagrams of typical cases. The Teddington Conference on mechanization of thought processes took place in the UK and among the documents submitted were John McCarthy's Programs with Common Sense, Oliver Selfridge's Pandemonium, and Marvin Minsky's Some Methods of Heuristic Programming and Artificial Intelligence. Late 50's & Early 60's 1961James Slagle (PhD Dissertation, MIT) wrote (in Lisp) the first symbolic integration program, SAINT, which solved the problems of calculus at the level of a university freshman. 1962 Unimation was founded as the first industrial robotics company. A 1963 Thomson Evans' program, ANALOGY, written as part of his doctoral thework at MIT, showed that computers can solve the same analogy problems as those shown on IQ tests. Ivan Sutherland's MIT Dissertation on Sketchpad introduced the idea of interactive graphics into computing. Edward A. Feigenbaum & Julian Feldman published Computers and Thought, the first collection of articles on artificial intelligence. 1964 Dusan Bobrow's dissertation on MIT (tech.report #1 from MIT AI, Project MAC) shows that computers understand natural language well enough to properly solve algebra problems. Bert Raphael's MIT dissertation on the SIR program demonstrates the power of logical representation of knowledge for the question-answer systems of 1965J. Alan Robinson invented the mechanical evidence procedure, a resolution method that allowed programs to work effectively with formal logic as a representative language. (See Carl Hewitt's downloadable PDF file Central History of Logical Programming). Joseph Weizenbaum (MIT) built ELIZA, an interactive program that continues to dialogue in English on any topic. It was a popular ay at AI centers on ARPA-net when a version that simulated psychotherapist dialogue was programmed. 1966Ross Quillian (Dissertation, Carnegie Inst. Technology; now CMU) demonstrated semantic networks. First machine workshop in Edinburgh - the first of an influential annual series organized by Donald Michie and others. Negative report on machine translation kills a lot of work in natural language processing (NLP) for many years. The 1967Dendral program (Edward Feigenbaum, Joshua Lederberg, Bruce Buchanan, Georgia Sutherland at Stanford) demonstrated interpreting mass spectra on organic chemical compounds. First successful knowledge programme for scientific reasoning. Joel Moses (PhD working at MIT) demonstrated the power of symbolic reasoning for integration issues in Macsyma (PDF file). The first successful knowledge program in mathematics. Richard Greenblatt at MIT built a knowledge-based chess-playing program, MacHack, that was good enough to achieve a grade-C rating in tournament play. The late 60sDoug Engelbart invented the mouse at SRI. 1968Marvin Minsky & Seymour Papert publish Perceptrons, demonstrating the limits of simple neural networks. The 1969SRI robot, Shakey, demonstrated combining movement, perception and problem solving. Roger Schank (Stanford) defined a conceptual addiction model for natural language understanding. Later developed (in a PhD dissertation at Yale) for use in the story understanding Robert Wilensky and Wendy Lehnert, and for use in understanding the memory of Janet Kolodner. The first International Joint Conference on Artificial Intelligence (IJCAI) held in Washington, DC 1970Jaime Carbonell (Sr.) has developed SCHOLAR, an interactive program for computer-assisted instructions based on semantic networks as a representation of knowledge. Bill Woods described the Extended Transition Network (ATN) as a representation for natural language understanding. Patrick Winston's PhD program, ARCH, at MIT learned concepts from examples in the world of children's blocks. Early 70'sJane Robinson & Don Walker founded an influential natural language processing group at SRI. 1971Terry Winograd's PhD work (MIT) demonstrated the ability of computers to understand English sentences in the limited world of children's blocks, in conjunction with his language of understanding program, SHRDLU, with a robot arm that carries out instructions written in English. 1972Prolog developed by Alain Colmerauer. A 1973 Assembly robotics group at Edinburgh University builds Freddy, a famous Scottish robot that is able to use vision to find and assemble models. 1974Ted Shortliffe's PhD dissertation at MYCIN (Stanford) demonstrated the power of rule-based systems for representing knowledge and conclusions in the field of medical diagnosis and therapy. Sometimes called the first expert system. Earl Sacerdoti developed one of the first planning programs, ABSTRIPS, and developed hierarchical planning techniques. 1975Marvin Minsky published his widely-read and influential article on frames as a representation of knowledge, combining many ideas about schemes and semantic ties. Meta-Dendral training program produced new results in chemistry (some weight rules the first scientific discoveries of the computer to be published in the Official Journal. In the mid-1970s Barbara Grosz (SRI) set limits on traditional AI approaches to discourse modeling. Subsequent works by Grosz, Bonnie Webber and Candace Sidner developed the concept of centering, which is used in creating focus discourse and anphoric references in NLP. Alan Kay and Adele Goldberg (Xerox PARC) have developed Smalltalk, which sets the power of object-oriented programming and icon-oriented interfaces. David Marr and MIT colleagues describe the initial sketch and its role in visual perception. The 1976Doug Lenat am program (Stanford PhD Dissertation) demonstrated a discovery model (a loosely-controlled search for interesting guesswork). Randall Davis demonstrated the power of meta-level reasoning in his PhD dissertation at Stanford. The late 70'sStanford's SUMEX-AIM resource, led by Ed Feigenbaum and Joshua Lederberg, demonstrates the power of ARPAnet for scientific collaboration. 1978Tom Mitchell, at Stanford, invented the concept of Version Spaces to describe the search space concept formation program. Herb Simon won the Nobel Prize in Economics for his theory of bounded rationality, one of the cornerstones of AI known as satisficing. The MOLGEN programme, written at Stanford by Mark Stefik and Peter Friedland, has shown that object-oriented representation of knowledge can be used to plan gene cloning experiments. The 1979 Mycin program, originally written as Ted Shortliffe's Ph.D. dissertation at Stanford, has been shown to perform at expert level. Bill VanMelle's PhD dissertation at Stanford demonstrated the generality of mycin representation of knowledge and style of reasoning in his EMYCIN program, a model for many commercial shell system professionals. Jack Myers and Harry Pople at the University of Pittsburgh developed INTERNIST, a knowledge-based medical diagnosis program based on Dr. Myers' clinical knowledge. Cordell Green, David Barstow, Elaine Kant and others at Stanford demonstrated the CHI system for automatic programming. The Stanford trolley, built by Hans Moravec, becomes the first computer-controlled autonomous vehicle to successfully cross a chair-filled room and circumnavigate Stanford AI Lab. Drew McDermott & Jon Doyle at MIT and John McCarthy at Stanford begin publishing work on the monotonous logic and formal aspects of truth maintenance. 1980'sLisp machines developed and marketed. The first professional system shells and commercial applications. 1980Lee Erman, Rick Hayes-Roth, Victor Lesser and Raj Reddy published the first description of the whiteboard model, as the framework for the HEARSAY-II speech comprehension system. The first National Conference of the American Association of Artificial Intelligence (AAAI) held at Stanford. 1981Danny Hillis proposes a coupling device, a massive parallel architecture that brings new power to AI, and calculations in general. (Later found Thinking (a) Act 18/201 1983John Laird & Paul Rosenbloom, in collaboration with Allen Newell, complete dissertation of CMU on soar. James Allen invents The Calculus Interval, the first widely used formalization of time events. Mid 80'sNeural Networks are widely used with the Backpropagation algorithm (first described by Werbos in 1974). The 1985Autonomous Drawing program, Aaron, created by Harold Cohen, is demonstrated at the AAAI National Conference (based on more than a decade of work, and with subsequent work showing significant developments). 1987Marvin Minsky publishes The Society of The Mind, a theoretical description of the mind as a collection of cooperating agents. 1989Dean Pomerleau at CMU creates alvinn (autonomous ground vehicle in neural networks), which grew into a system that drove a car from coast to coast under the control of a computer for all but about 50 of the 2,850 miles. The 1990's Major advances in all areas of AI, with significant demonstrations in machine learning, intelligent learning, case-based reasoning, multi-agent planning, planning, uncertain reasoning, data mining, natural language understanding and translation, vision, virtual reality, games and other topics. Rod Brooks' COG project at MIT, with many collaborators, is making significant progress in building the humanoid robot TD-Gammon, a backgammon program written by Gerry Tesauro, showing that reinforcement learning is powerful enough to create a championship-level gaming program by competing favorably with world-class players. EQP sentence prover at Argonne National Labs proves Robbins guesswork in mathematics (October-November 1996). Deep Blue chess program defeats the current world chess champion, Garry Kasparov, in a widely watched match and rematch (See Deep Blue Wins). (11 May 1997). Nasa's pathfinder mission successfully landed and the first autonomous robotic system, Sojourner, was deployed on the surface of Mars. (4 July 1997) First official Robo Cup football match

(1997) with 40 teams interacting with robots and more than 5000 spectators. Web browsers and other AI-based information extraction programs are becoming essential for widespread use around the world. Demonstration of smart room and emotional agents at MIT AI Lab. Start work on oxygen architecture that connects mobile and stationary computers in an adaptive network. 2000'sInteractive robot pets (a.ka smart toys) are becoming commercially available, realizing the vision of the 18th century. Cynthia Breazeal at MIT publishes her dissertation on social machines, describing KISMET, a robot with a face that expresses emotion. Stanford's autonomous vehicle, Stanley, will win the DARPA Grand Challenge race. (October 2005). (See In a gruelling desert race, the winner, but not the driver. A nodule robot is exploring remote areas of Antarctica looking for meteorite samples. TodaySee AITopics Home page for history in the making! Selected references Buchanan, Bruce G. A. A brief history of artificial intelligence. AI Magazine 26(4): Winter 2005, 53–60. Cohen, Jonathan. Human robots in myth and science. NY: A.S.Barnes, 1967. Feigenbaum, E.A. & Feldman, J. (eds.) Computers and thinking. NY: McGraw-Hill, 1963. Gardner, Martin. Logic machines and diagrams. Ny: McGraw-Hill, 1958. McCorduck, Pamela. Machines that think. San Francisco: W.H. Freeman, 1979.