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Predicament handled by Intelligence Systems in Precinct

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Abstract

Artificial Intelligence (A.I.) is a multidisciplinary field whose goal is to automate activities that presently require human intelligence. Recent successes in A.I. include computerized medical diagnosticians and systems that automatically customize hardware to particular user requirements. The major problem areas addressed in A.I. can be summarized as Perception, Manipulation, Reasoning, Communication, and Learning. Finally, Learning treats the problem of automatically improving system performance over time based on the system's experience. Many important technical concepts have arisen from A.I. that unify these diverse problem areas and that form the foundation of the scientific discipline. This organization process can be generally characterized as a Search directed toward specific goals. The search is made complex because of the need to determine the relevance of information and because of the frequent occurrence of uncertain and ambiguous data. Heuristics provide the A.I. system with a mechanism for focusing its attention and controlling its searching processes. The necessarily adaptive org...

Keywords: Natural Language Generation, NLP, Speech Recognition, Machine Learning, Problems.

1. Introduction

―The science and engineering of making intelligent machines, especially intelligent computer programs‖. **-John McCarthy.** Artificial Intelligence is an approach to make a computer, a robot, or a product to think how smart human think. AI is a study of how human brain think, learn, decide and work, when it tries to solve problems. And finally this study outputs intelligent software systems. The aim of AI is to improve computer functions which are related to human knowledge, for example, reasoning, learning, and problem-solving. Many important technical concepts have arisen from A.I. that unify these diverse problem areas and that form the foundation of the scientific discipline.

2. History

Thought-capable artificial beings appeared as storytelling devices in antiquity, and have been common in fiction, as in Mary Shelley's Frankenstein or Karel Čapek's R.U.R. (Rossum's Universal Robots).

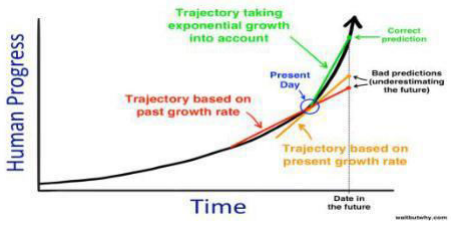

Fig 1: History of Human Progress

3. Applications

AI is relevant to any intellectual task. Modern artificial intelligence techniques are pervasive and are too numerous to list here. Frequently, when a technique reaches mainstream use, it is no longer considered artificial intelligence; this phenomenon is described as the AI effect.

➢ **Healthcare**

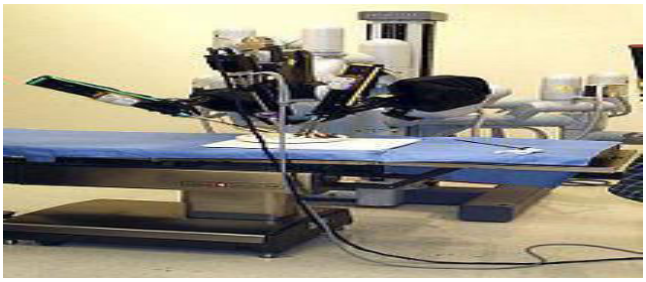

Fig 2: Surgical System AI

A patient-side surgical arm of Da Vinci Surgical System AI is being applied to the high cost problem of dosage issues

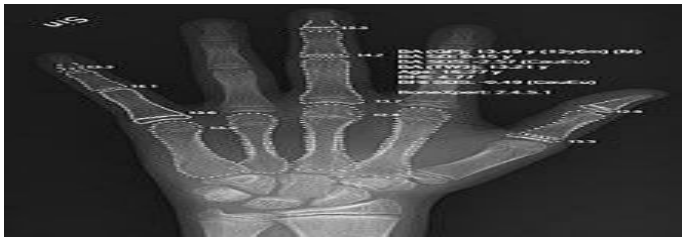

Fig 3: AI X-ray

X-ray of a hand, with automatic calculation of bone age by computer software

DRIVERLESS CARS

Advancements in AI have contributed to the growth of the automotive industry through the creation and evolution of self-driving vehicles. As of 2016, there are over 30 companies utilizing AI into the creation of driverless cars. A few companies involved with AI include Tesla, Google, and Apple.

➢ **VIDEO GAMES**

In video games, artificial intelligence is routinely used to generate dynamic purposeful behaviour in non-player characters (NPCs).

➢ **MILITARY**

Further information: Artificial intelligence arms race, Lethal autonomous weapon, and Unmanned combat aerial vehicle. .

➢ **AUDIT**

For financial statements audit, AI makes continuous audit possible. AI tools could analyse many sets of different information immediately. The potential benefit would be the overall audit risk will be reduced, the level of assurance will be increased and the time duration of audit will be reduced.

➢ **ADVERTISING**

It is possible to use AI to predict or generalize the behaviour of customers from their digital footprints in order to target them with personalized promotions or build customer personas automatically.

4. TOP 10 AI TECHNOLOGIES

4.1. NLP

Saying (or writing) the right words in the right sequence to convey a clear message that can be easily understood by the listener (or reader) can be a tricky business. For a machine, which processes information in an entirely different way.

4.2. SPEECH RECOGNITION

Transcribe and transform human speech into format useful for computer applications. Currently used in interactive voice response systems and mobile applications. Every day, more and more systems incorporate the transcription and transformation of human language into useful formats suitable for computers.

Fig 4: Speech Recognition

4.3. MACHINE LEARNING PLATFORMS

These days, computers can also learn, and they can be incredibly intelligent! Machine learning is a sub discipline of computer science and a branch of artificial intelligence. Its goal is to develop techniques that allow computers to learn.

4.4. VIRTUAL AGENTS

―The current darling of the media,‖ from simple chat boats to advanced systems that can network with humans. There's no denying that virtual agents—or **―chat bots‖** (or simply, bots)— are experiencing a tremendous resurgence in interest, and along with that, a rapid advance in innovation and technology.

4.5. DECISION MANAGEMENT

Engines that insert rules and logic into AI systems and used for initial setup/training and on-going maintenance and tuning. It is used in a wide variety of enterprise applications, assisting in or performing automated decision-making.

4.6. AI-OPTIMIZED HARDWARE

Companies are investing heavily in ML/AI with hardware designs intended to greatly accelerate the next generation of applications. Graphics processing units (GPU) and appliances specifically designed and architected to efficiently run AI-oriented computational jobs.

4.7. DEEP LEARNING PLATFORMS

Deep learning is the fastest growing field and the new big trend in machine learning. A set of algorithms that use artificial neural networks to learn in multi-levels, corresponding to different levels of abstraction.

4.8. ROBOTIC PROCESS AUTOMATION

Robotic processes automation is possible thanks to scripts and methods that mimic and automate human tasks to support corporate processes. It is now being used in special situations where it's too expensive or inefficient to hire humans for a specific job or task.

9. TEXT ANALYTICS AND NLP

Natural language processing (NLP) is concerned with the interactions between computers and human (natural) languages. This technology uses text analytics to understand the structure of sentences, as well as their meaning and intention, through statistical methods and machine learning.

10. BIOMETRICS

This technology deals with the identification, measurement and analysis of physical aspects of the body's structure and form and human behaviour. It allows more natural

interactions between humans and machines, including interactions related to touch, image, speech and body language recognition.

5. Tic-Tac-Toe

If someone has a "threat" (that is, two in a row), take the remaining square. Otherwise, if a move "forks" to create two threats at once, play that move. Otherwise, take the centre square if it is free. Otherwise, if your opponent has played in a corner, take the opposite corner.

6. PROBLEMS

The overall research goal of artificial intelligence is to create technology that allows computers and machines to function in an intelligent manner. The general problem of simulating (or creating) intelligence has been broken down into sub-problems. These consist of particular traits or capabilities that researchers expect an intelligent system to display. The traits described below have received the most attention.

6.1. REASONING, PROBLEM SOLVING

Early researchers developed algorithms that imitated step-by-step reasoning that humans use when they solve puzzles or make logical deductions. By the late 1980s and 1990s, AI research had developed methods for dealing with uncertain or incomplete information.

6.2. KNOWLEDGE REPRESENTATION

Ontology represents knowledge as a set of concepts within a domain and the relationships between those concepts.

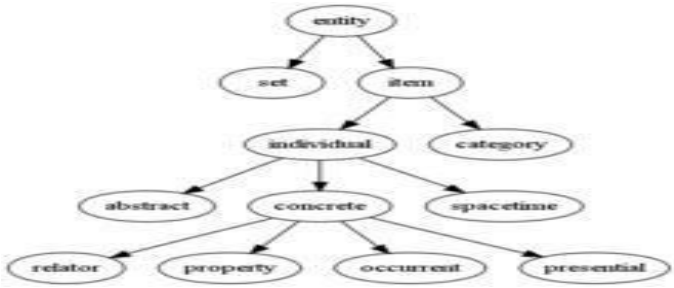

Fig 5: Knowledge Representation

Knowledge representation and knowledge engineering are central to classical AI research. Some "expert systems" attempt to gather together explicit knowledge possessed by experts in some narrow domain. In addition, some projects attempt to gather the "common sense knowledge" known to the average person into a database containing extensive knowledge about the world.

6.3. PLANNING

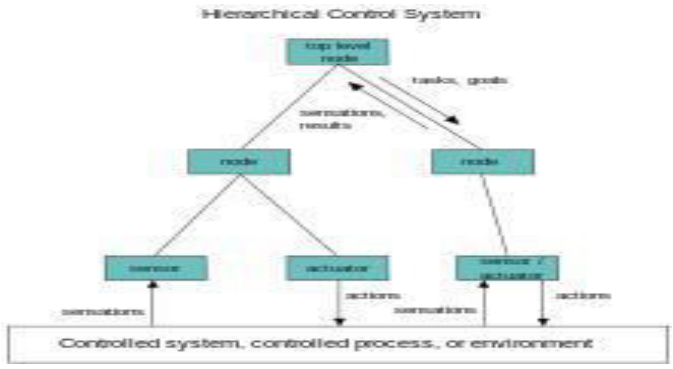

Fig 6: Planning

A hierarchical control system is a form of control system in which a set of devices and governing software is arranged in a hierarchy.

7. APPROACHES

There is no established unifying theory or paradigm that guides AI research. Researchers disagree about many issues. A few of the most long standing questions that have remained unanswered are these.

7.1. CYBERNETICS AND BRAIN SIMULATION

In the 1940s and 1950s, a number of researchers explored the connection between neurobiology, information theory, and cybernetics. Some of them built machines that used electronic networks to exhibit rudimentary intelligence.

7.2. SYMBOLIC

When access to digital computers became possible in the middle 1950s, AI research began to explore the possibility that human intelligence .would eventually succeed in creating a machine with artificial general intelligence and considered this the goal of their field.

7.3. LOGIC-BASED

Unlike Simon and Newell, John McCarthy felt that machines did not need to simulate human thought, but should instead try to find the essence of abstract reasoning and problem-solving, regardless of whether people used the same algorithms. His laboratory at Stanford (SAIL) focused on using formal logic to solve a wide variety of problems, including knowledge representation, planning and learning.

7.4. ANTI-LOGIC OR SCRUFFY

Researchers at MIT (such as Marvin Minsky and Seymour Paper) found that solving difficult problems in vision and natural language processing required ad-hoc solutions—they argued that there was no simple and general principle (like logic) that would capture all the aspects of intelligent behaviour.

7.5. KNOWLEDGE-BASED:

When computers with large memories became available around 1970, researchers from all three traditions began to build knowledge into AI applications.

8. TOOLS

AI has developed a large number of tools to solve the most difficult problems in computer science. A few of the most general of these methods are discussed below.

8.1. SEARCH AND OPTIMIZATION

Many problems in AI can be solved in theory by intelligently searching through many possible solutions: Reasoning can be reduced to performing a search.

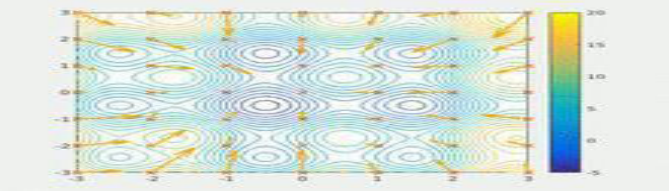

Fig 8: Search and Optimization

A particle swarm seeking the global minimum Evolutionary computation uses a form of optimization search. For example, they may begin with a population of organisms (the guesses) and then allow them to mutate and recombine.

8.2. LOGIC

Logic is used for knowledge representation and problem solving, but it can be applied to other problems as well. For example, the sat plan algorithm uses logic for planning and inductive logic programming is a method for learning. Probabilistic methods for uncertain reasoning

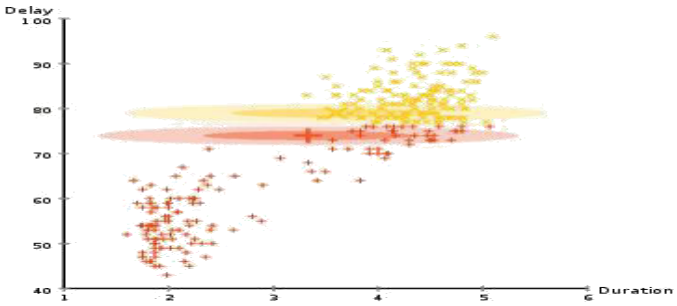

Fig 9: graph for clustering

Expectation-maximization clustering of Old Faithful eruption data starts from a random guess but then successfully converges on an accurate clustering of the two physically distinct modes of eruption.

8.3. Classifiers and statistical learning methods

The simplest AI applications can be divided into two types: classifiers ("if shiny then diamond") and controllers ("if shiny then pick up"). Controllers do, however, also classify conditions before inferring actions, and therefore classification forms a central part of many AI systems. Classifiers are functions that use pattern matching to determine a closest match. They can be tuned according to examples, making them very attractive for use in AI.

These examples are known as observations or patterns. In supervised learning, each pattern belongs to a certain predefined class. A class can be seen as a decision that has to be made. All the observations combined with their class labels are known as a data set. When a new observation is received, that observation is classified based on previous experience.

8.4. ARTIFICIAL NEURAL NETWORKS

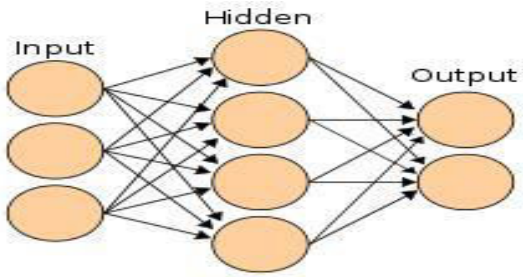

Fig 10: ANN

Neural networks, or neural nets, were inspired by the architecture of neurons in the human brain. A simple "neuron" N accepts input from multiple other neurons, each of which, when activated (or "fired"), cast a weighted "vote" for or against whether neuron N should itself activate. Learning requires an algorithm to adjust these weights based on the training data; one simple algorithm (dubbed "fire together, wire together") is to increase the weight between two connected neurons when the activation of one triggers the successful activation of another.

CONCLUSION

AI is at the centre of a new enterprise to build computational models of intelligence. The main assumption is that intelligence (human or otherwise) can be represented in terms of symbol structures and symbolic operations which can be programmed in a digital computer. There is much debate as to whether such an appropriately programmed computer would be a mind, or would merely simulate one, but AI researchers need not wait for the conclusion to that debate, nor for the hypothetical computer that could model all of human intelligence. Aspects of intelligent behaviour, such as solving problems, making

inferences, learning, and understanding language, have already been coded as computer programs, and within very limited domains.AI programs can outperform human experts. Now the great challenge of AI is to find ways of representing the common-sense knowledge and experience that enable people to carry out everyday activities such as holding a wide-ranging conversation, or finding their way along a busy street. Conventional digital computers may be capable of running such programs, or we may need to develop new machines that can support the complexity of human thought.

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