Artificial Intelligence

The phrase *artificial intelligence* was first used in 1955. It is defined as "the scientific understanding of the mechanisms underlying thought and intelligent behavior and their embodiment in machines." Sometimes, a task needs artificial intelligence to be very logical. At other times, it may need artificial intelligence to think and behave with human biases. The goals in the field of artificial intelligence are to develop systems that can do both.

A prototype Mars rover decides how to navigate obstacles.

Applications Artificial intelligence already is used in many areas, and it will do even more for us in the future. When a computer plays chess, it searches through hundreds of thousands of possible moves before selecting the best one. Research is being done to improve the efficiency of search algorithms.

Artificial intelligence currently is used for speech recognition to allow hands-free dialing of cell phones and for some interactive telephone transactions. It is not yet fully capable of understanding natural language, but that is a goal.

Three-dimensional computer vision is another future application. To mimic the sensory input and behaviors of humans, computers need to extract three-dimensional reality from two-dimensional images. Progress has been made, but humans are still much better than computers at this. With improved vision, artificial intelligence may control automobiles on Earth, or robots exploring another planet, with no human navigators needed.

Artificial intelligence also is used to create expert systems in computers that are programmed with knowledge about specific topics. Humans can tell the computer the details of a specific situation, and the computer calculates the most logical course of action. In a medical environment, an expert system can be used to accurately diagnose disorders. Artificial intelligence weighs the facts of the situation and then infers which actions are most appropriate. However, artificial intelligence can operate only with facts that have been taught to the computer. Users must constantly be aware of this limitation of expert systems.

The robot, Kismet, displays human facial expressions.

Careers Studying mathematics, mathematical logic, and computer programming languages is important for developing systems that can make rational decisions. Knowledge of psychology assures that these decisions also can have a human character.

Going Further

1. **Debate the Issue** Are there ethical limits to the development of artificial intelligence?
2. **Recognize Cause and Effect** What problems might cause an expert system to make a poor decision?
3. **Critical Thinking** In what situations must artificial intelligence be absolutely rational, and in what situations should it include human biases?

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