

What is Artificial Intelligence?

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December 23, 2023

Exploring the Transformative Use Cases of AI

Artificial Intelligence (AI) is revolutionizing countless fields, automating tasks typically performed by humans, and opening up new frontiers in technology. Here are some of the most impactful use cases of AI:

- Medical Imaging: Enhancing disease detection and diagnosis.
- Agriculture: Detecting and classifying plant diseases using smartphones.
- Autonomous Driving: Achieving near-human levels of driving autonomy.
- Education: Personalizing and improving learning experiences.
- Disaster Prevention: Predicting natural disasters like floods, hurricanes, or earthquakes.
- Manufacturing: Improving efficiency and quality control.
- Creative Arts: Innovating in art creation and design.

... and many more including speech transcription, language translation, scientific problem-solving, and digital assistance.

Understanding AI and Its Foundations

Artificial Intelligence aims to mimic and automate the tasks normally done by humans, ranging from simple calculations in an Excel spreadsheet to complex decisions made by humanoid robots. Human tasks typically involve four categories of thinking:

1. Abstraction
2. Reasoning
3. Pattern recognition
4. Use of intuition

Traditional software engineering approaches AI with a formulaic structure: $\text{Input} + \text{Process} = \text{Output}$. Here, 'Process' refers to hardcoded rules mapping inputs to outputs, like a calculator squaring a number. This approach encapsulates abstraction and reasoning well.

The Advent of Machine Learning

Machine Learning revolutionizes this approach by letting the machines formulate the 'Process' themselves: $\text{Input} + \text{Output} = \text{Process}$. It feeds on examples to learn the distinguishing features or patterns, essentially encoding capabilities for pattern recognition and intuition.

Shallow Machine Learning

Shallow Machine Learning involves simple algorithms that are super-efficient, especially with limited data. It's capable of 1-2 transformations of input data and typically falters with complex data like images. This category includes probabilistic models, kernel methods, and decision trees.

Deep Machine Learning (Deep Learning)

Deep Learning can handle almost an unlimited amount of transformations, representing complex data effectively. It requires more data than shallow learning but yields significantly better results and utilizes a family of algorithms known as Neural Networks.

Conversion of Input and Output Modalities

At the core, computers convert all modalities, be it images, text, or sound, into numerical values. For instance, it interprets images through pixel values.

Envisioning the Future of Machine Learning

The future is about blending the abstraction and reasoning of traditional software engineering with the intuition and pattern recognition of current machine learning. This hybrid approach promises to bring us tools and solutions like AlphaGo or FunSearch, where AI isn't just a tool but a partner in innovation.