AI Overview

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What is artificial intelligence?

- Area of computer science whose goal is to allow computers to:
  - do things that require intelligence
  - do things humans/animals easily do, but hard for computers
  - solve intractable problems on average more quickly

- Enormous number of AI areas/techniques:
  - Automated reasoning: theorem proving, planning, scheduling
  - Intelligent agent control
  - Interpreting senses: natural language processing, computer vision
  - Knowledge based (expert) systems
  - Machine learning
What can AI do?

- Web search
- Intelligent control
- Planning complex operations
- Diagnostic reasoning
- Natural language processing
- Image understanding and generation
- Sentiment analysis, etc., for social media
- Data mining and analysis
- ...
Why AI now?
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Predicted Economic Effect of AI
$ in Millions

In 2014, Google acquired DeepMind, a London-based start-up company specialising in deep learning, for more than $500M and set a record of company investment of AI research to academic standard. In fact, DeepMind has produced over 140 journal and conference papers and has had four articles published in Nature since 2012. One of the achievements of DeepMind was in developing AI technology able to create general-purpose software agents that adjust their actions based only on a cumulative reward. This reinforcement learning approach exceeds human level performance in many aspects and has been demonstrated with the defeat of the world Go game champion; marking a historical landmark in AI progress.

IBM has developed a supercomputer platform, Watson, which has the capability to perform text mining and extract complex analytics from large volumes of unstructured data. To demonstrate its abilities, IBM Watson, in 2011, beat two top players on 'Jeopardy!', a popular quiz show, that requires participants to guess questions from specific answers. Although, information retrieval is trivial for computer systems, comprehension of natural language is still a challenge. This achievement has had a significant impact on the performance of web searches and the overall ability of AI systems to interact with humans. In 2015, IBM bought AlchemyAPI to incorporate its text and image analysis capabilities in the cognitive computing platform of the IBM Watson. The system has already been used to process legal documents and provide support to legal duties. Experts believe that these capabilities can transform current health care systems and medical research.

Research in top AI firms is centred on the development of systems that are able to reliably interact with people. Interaction takes more natural forms through real-time speech recognition and translation capabilities. Robo-advisor applications are at the top of the AI market with a globally estimated 255 billion in US dollars by 2020. There are already several virtual assistants offered by major companies. For example, Apple offers Siri and Amazon Alexa, Microsoft

Source: Perez et al., UK-RAS white paper on Artificial Intelligence and Robotics
Why AI now?

Venture Capital Investment in AI Technology
$ in Millions

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AI and UMaine

Collaborators

Roux Institute

AI Research

AI Applications

Intelligent Data Gathering
Scientific Applications
Software Privacy
Spatial Informatics
Virtual Humans
Data Science
Marine Organism Identification
Engineering Applications
Art
Science
Forestry Image Analysis
Engineering
Counting Maine Seabirds

AI Resources

NSF MRI-funded
PetaFLOP GPU Cluster

UMaine

AI Outreach

K-12 Education
Forestry & Agriculture
Workforce Training/Retraining
Public Education & Outreach
Industry
Fisheries
Government