DAVID LEAKE

LEVERAGING LEARNING FROM SINGLE EXPERIENCES
Learning from Big and Small Data

• How AlphaZero learned great chess: Playing 19.6 million games
• 19.6 million games of chess would take a human 1500 years
• Luckily, humans can learn from limited examples
• When data is limited, or testing and failing is not an option, AI systems need to leverage limited examples
Human Experts Exploit Experiences

In a [medical] conference attended by a respected professor from another hospital, the chief of a service calls on that [professor], ... with a request not for the latest news of research from the journals but for an anecdote: Anybody had any experience with this? (Hunter, 86)
Towards AI Systems that Make the Most of Each Experience

• Practical Goals:
  • Enabling reasoning from limited data
  • Leveraging data with domain knowledge
  • Providing explainable solutions

• Strategy: Case-Based Reasoning
  • Cognitively inspired reasoning and learning from cases
  • Memory + Analogical mapping + Adaptation to fit
Case-Based Reasoning (CBR)

- CBR solves new problems by remembering similar prior problems and adapting their solutions to fit new needs.
- CBR is both a cognitive model and an AI approach
Leveraging Experiences: Sample Projects

• Mining Web sources for knowledge to adapt cases
• Metareasoning to improve use of existing cases
• Integration with machine learning: Taking large data sources as starting point for:
  • Mining and selecting cases
  • Learning knowledge to support CBR (case adaptation knowledge)
THANK YOU

DAVID LEAKE
leake@indiana.edu
http://www.cs.indiana.edu/~leake