Artificial Intelligence

Tut 1/ week1

COSC2129

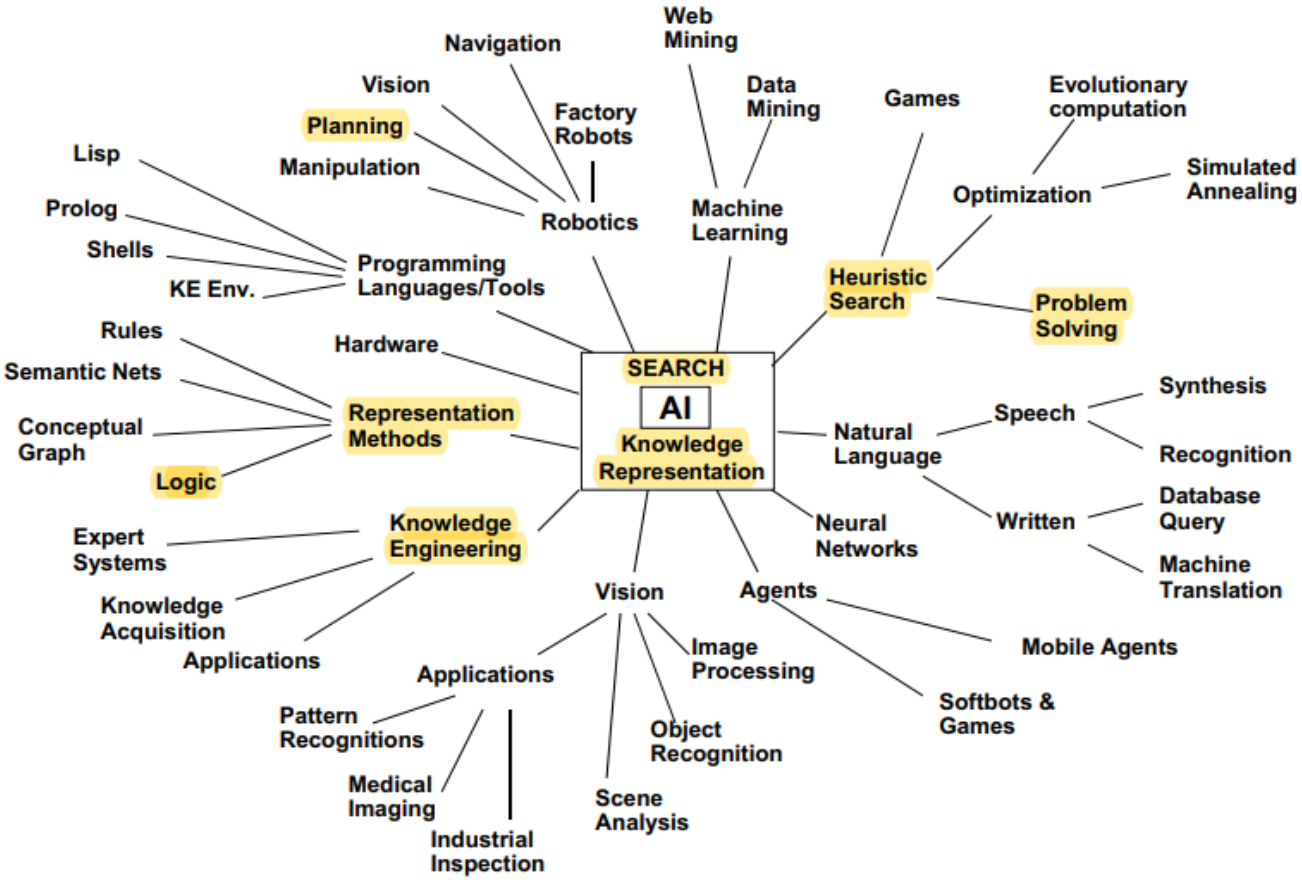
RMIT UNIVERSITY

Activity 1

- What is Artificial Intelligence?
- What is an example/application of AI that you have heard about/used?
- What is your current “AI knowledge"?
- What are you hoping to get out of this course?
- What are your interests or hobbies?

RMIT UNIVERSITY

An Overview of AI



RMIT UNIVERSITY

Course Objectives

- AI is cross-disciplinary, covering a huge variety of subfields ranging from scientific research to real-world applications.
- This course only introduces to the basic concepts and techniques of AI, leaving advanced topics for self-exploration or the undertaking of advanced courses.
- This course will help you gain AI-based problem solving skills that have applicability to a wide range of real-world problems.
- Basic concepts (and techniques) lays foundations for the success of in-depth studies and even job interviews.

Activity 2

- Can AI be creative?
- Can AI be empathetic?

RMIT UNIVERSITY

Can AI be creative?

- Who are they?

Faces generated by GAN, NVIDIA

RMIT UNIVERSITY

Can AI be creative?

- What is this?

RMIT UNIVERSITY

Can AI be creative?

Summary: Artificial Intelligence (AI), specifically GPT-4, was found to match the top 1% of human thinkers on a standard creativity test. The AI application ChatGPT, developed using GPT-4, excelled in fluency and originality in the Torrance Tests of Creative Thinking, a widely recognized tool for assessing creativity.

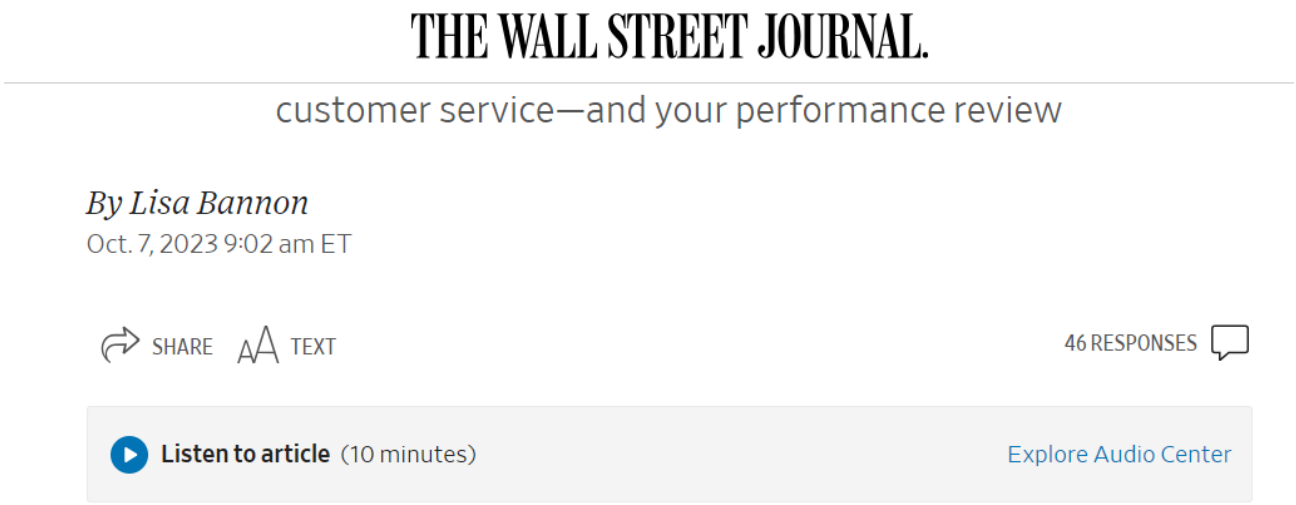
This breakthrough finding indicates that AI may be developing creative ability on par with or even surpassing human capabilities. Dr. Erik Guzik, the lead researcher, anticipates that AI, with its rapidly evolving advancements, will become a key tool for business innovation and entrepreneurship.

Key Facts:

1. The study showed that ChatGPT performed in the top 1% for originality, a new achievement for AI.
2. AI outperformed the majority of college students in the national creativity test.
3. Despite ChatGPT's success, it suggested the need for more sophisticated tools to differentiate between human and AI-generated ideas.

RMIT UNIVERSITY

Can AI be empathetic?



THE WALL STREET JOURNAL.

customer service—and your performance review

By Lisa Bannon
Oct. 7, 2023 9:02 am ET

SHARE TEXT 46 RESPONSES

Listen to article (10 minutes) Explore Audio Center

Busy, stressed-out humans aren't always good at expressing empathy. Now computer scientists are training artificial intelligence to be empathetic for us.

AI-driven large language models trained on massive amounts of voice, text and video conversations are now smart enough to detect and mimic emotions like empathy—at times, better than humans, some argue. Powerful new capabilities promise to improve interactions in customer service, human resources, mental health and other fields, tech experts say. They're also raising moral and ethical questions about whether machines, which lack remorse and a sense of responsibility, should be allowed to interpret and evaluate human emotions.

RMIT UNIVERSITY

Discussion

- You've heard:
  - Creativity Sets Humankind Apart from and Above All Other
  - Creativity Is Humanity's Only Advantage Against AI
  - Empathy, typically regarded as a uniquely human trait, refers to the ability to understand and share the emotions of others.
- …

RMIT UNIVERSITY

Discussion

- It is possible for AI to learn how to detect emotions and demonstrate empathy
- AI systems can respond to you in the most “compassionate” way (it decides from the data it has learnt)
- Because empathy can be learned, artificial Intelligence can surely be equipped with artificial empathy in the years to come (Jun Wu, Forbes, 2019)

- Now: 2023-2024
  - AI can be creative
  - AI can show empathetic

RMIT UNIVERSITY

What is AI?

- The science of making machines that:

Think like humans	Think rationally
Act like humans	Act rationally

Rational Decisions

- The term **rational** is used in a very specific, technical way:
  - Rational: maximally achieving pre-defined goals
  - Rationality only concerns what decisions are made (not the thought process behind them)
  - Goals are expressed in terms of the **utility** of outcomes
- Being rational means **maximizing your expected utility.**

A better title for this course would be:

Computational Rationality

RMIT UNIVERSITY

Activity 3

- What AI can/can't do?
  - Play a decent game of table tennis?
  - Play a decent game of Jeopardy?
  - Drive safely along a curving mountain road?
  - Drive safely along Telegraph Avenue?
  - Buy a week's worth of groceries on the web?
  - Buy a week's worth of groceries at Berkeley Bowl?
  - Discover and prove a new mathematical theorem?
  - Converse successfully with another person for an hour?
  - Perform a surgical operation?
  - Put away the dishes and fold the laundry?
  - Translate spoken Chinese into spoken English in real time?
  - Write an intentionally funny story?

RMIT UNIVERSITY

Weak AI vs Strong AI

- Strong AI
  - How do humans learn?

    from experience
- Weak AI
  - Can play chess but can't walk or make coffee

Weak AI vs Strong AI

Weak AI

- Focuses on performing a specific task
- Can perform one type of task
- Lacks human consciousness, but can simulate it sometimes
- Result is predictable
- Achievable and achieved now.

Strong AI

- Can perform a variety of functions
- Teaches itself to solve new problems
- Develops a human-like consciousness
- Result is not predictable
- For now more a vision.

RMIT UNIVERSITY

Activity 4

- **Practical Examples of Weak/Narrow AI?**
  - Play chess (search)
  - Digital voice assistants (Siri, Alexa)
  - Image and speech recognition
  - Recommendation engines
  - Search engines
  - Chatbots
  - Autonomous vehicles
  - Robots
  - …

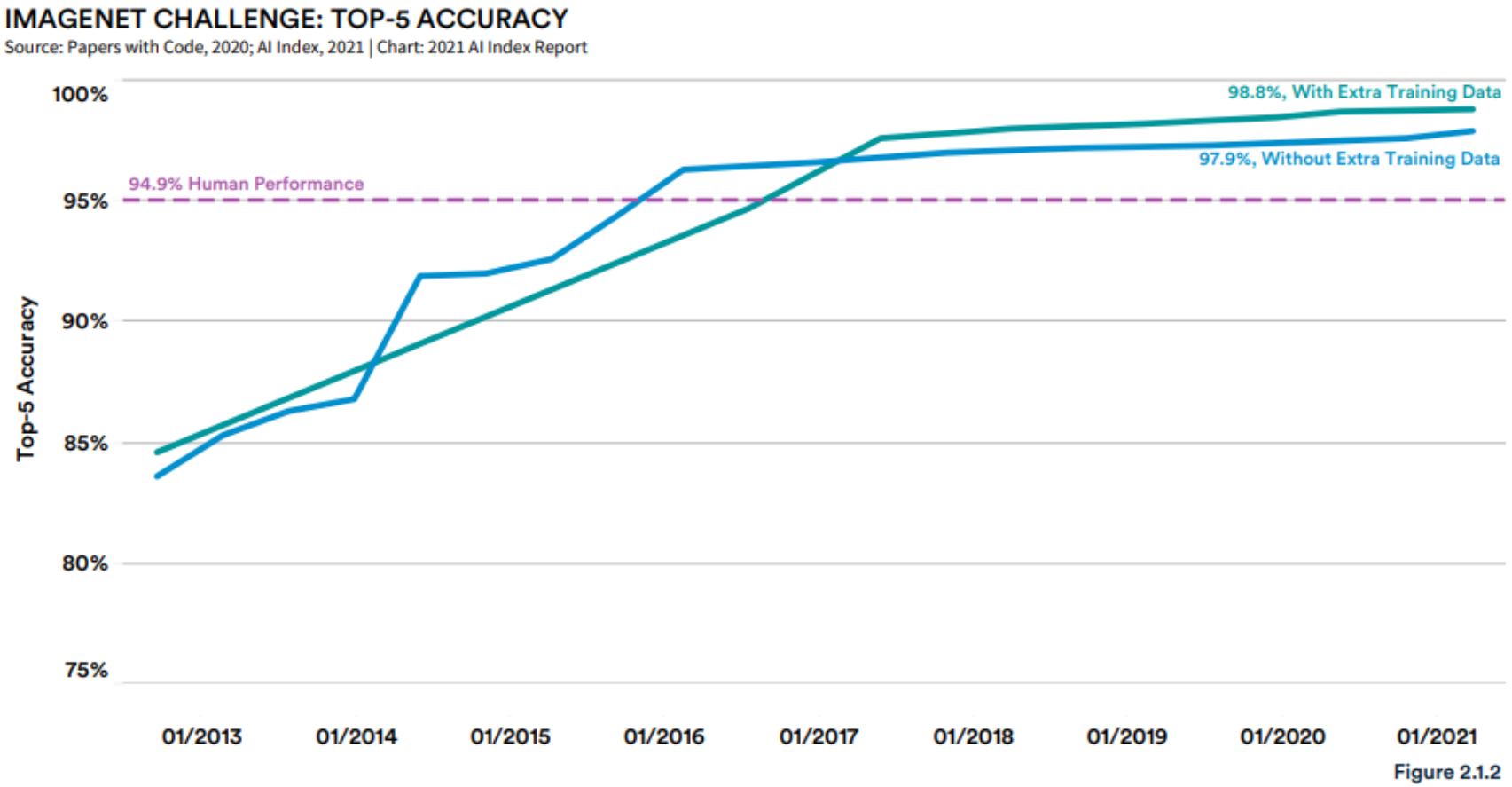
RMIT UNIVERSITY

AGI and GAI?

- What is GAI?
- What is AGI?

RMIT UNIVERSITY

State-of-the-art



2 Note: For data on human error, a human was shown 500 images and then was asked to annotate 1,500 test images; their error rate was 5.1% for Top-5 classification. This is a very rough baseline, but it gives us a sense of human performance on this task.

RMIT UNIVERSITY

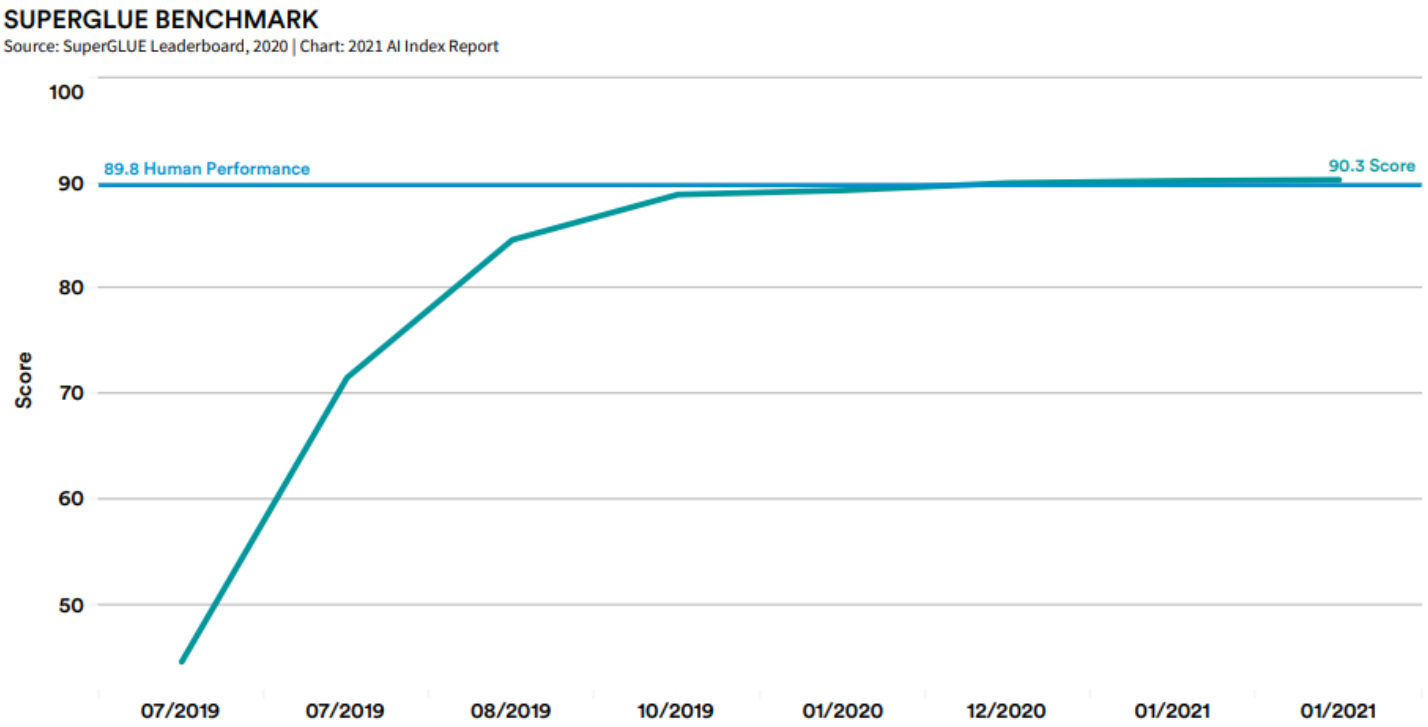
State-of-the-art

ENGLISH LANGUAGE UNDERSTANDING BENCHMARKS

SuperGLUE

Launched in May 2019, SuperGLUE is a single-metric benchmark that evaluates the performance of a model on

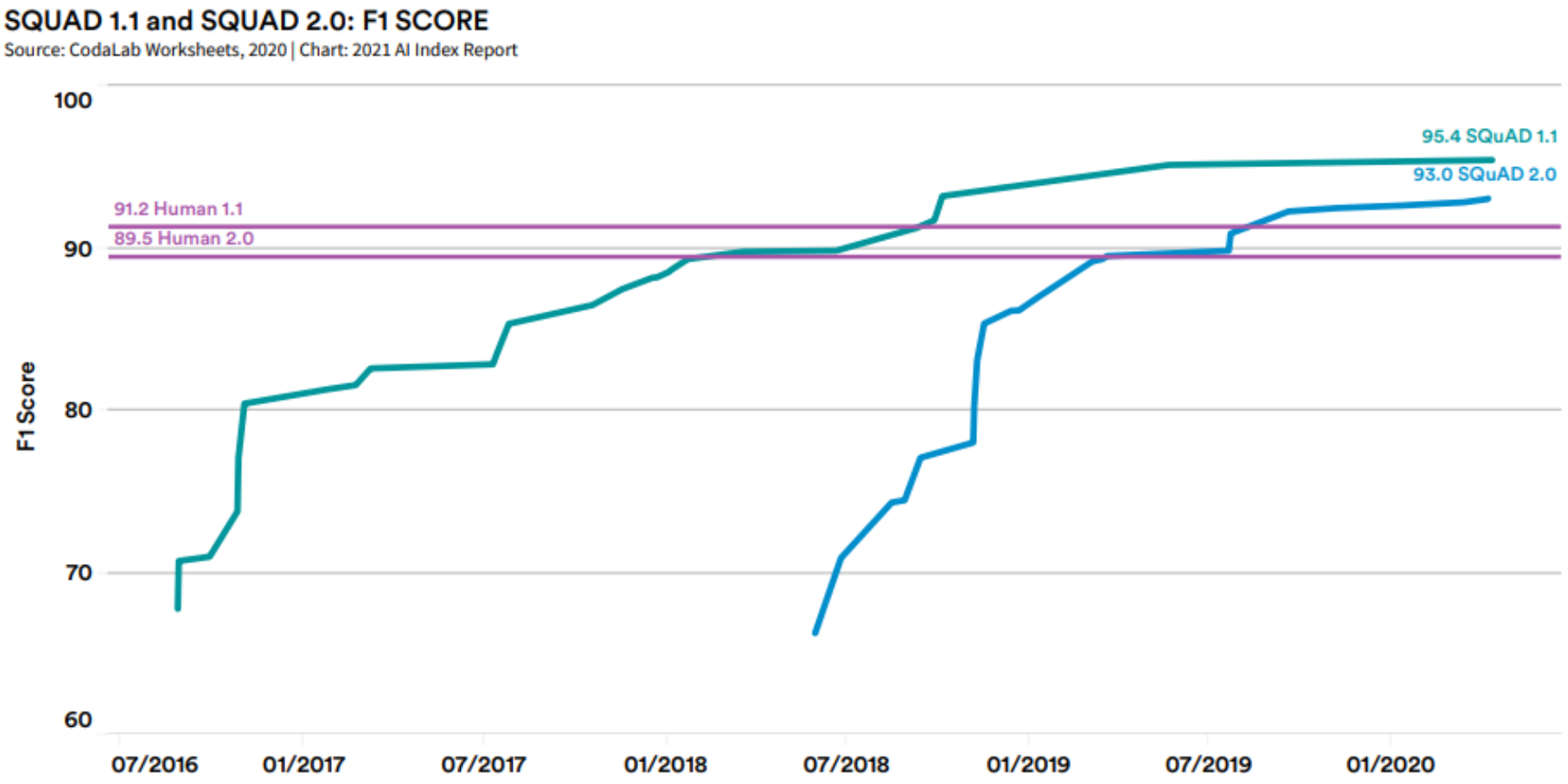
surpassed human performance on all SuperGLUE tasks, but it does mean that the average performance across the entire suite has exceeded that of a human baseline. The rapid pace of progress (Figure 2.3.1) suggests that SuperGLUE may need to be made more challenging or replaced by harder tests in the future, just as SuperGLUE replaced GLUE.



2021 AI Index Annual Report

RMIT UNIVERSITY

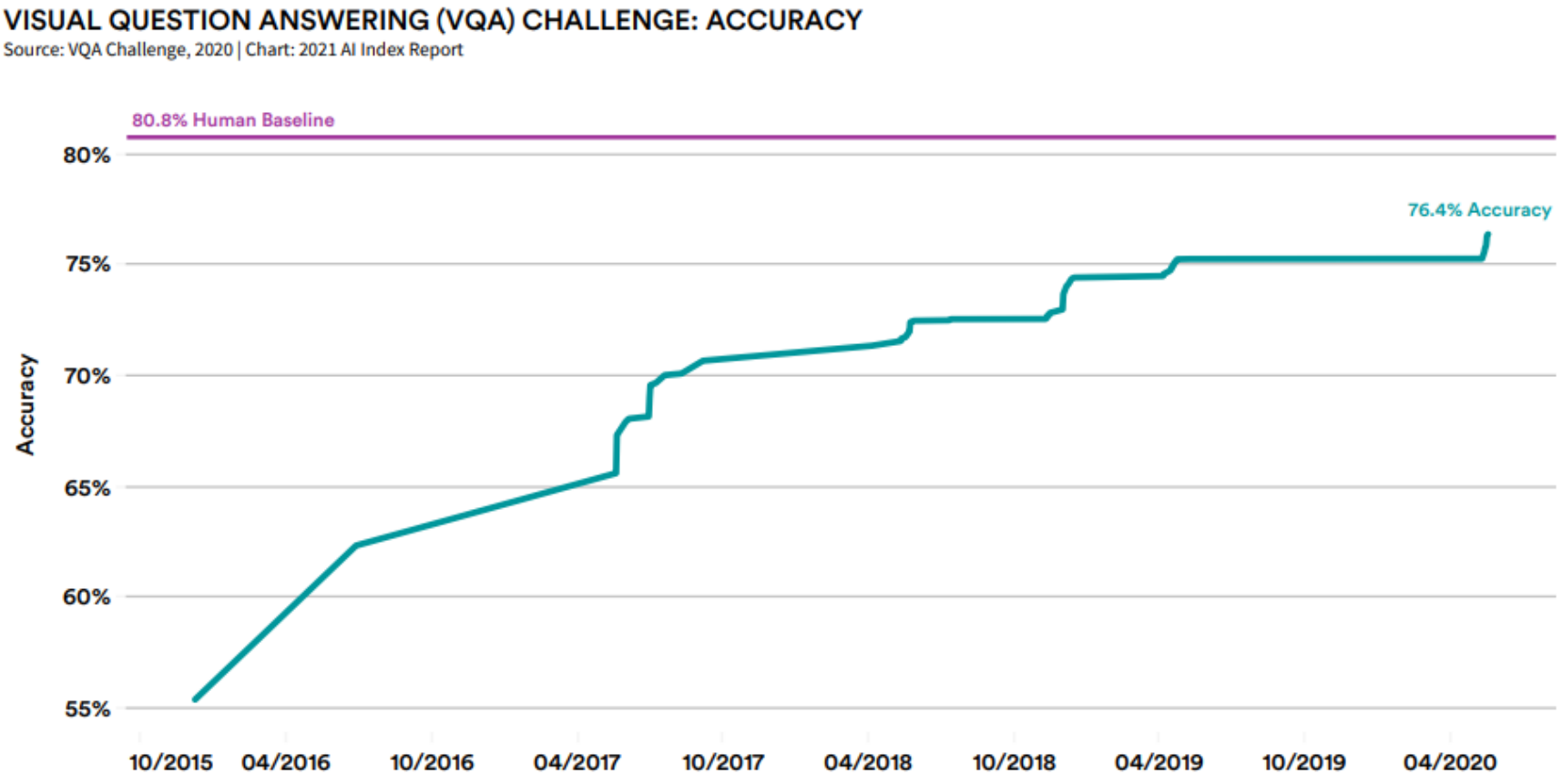
State-of-the-art



The Stanford Question Answering Dataset, or SQuAD

RMIT UNIVERSITY

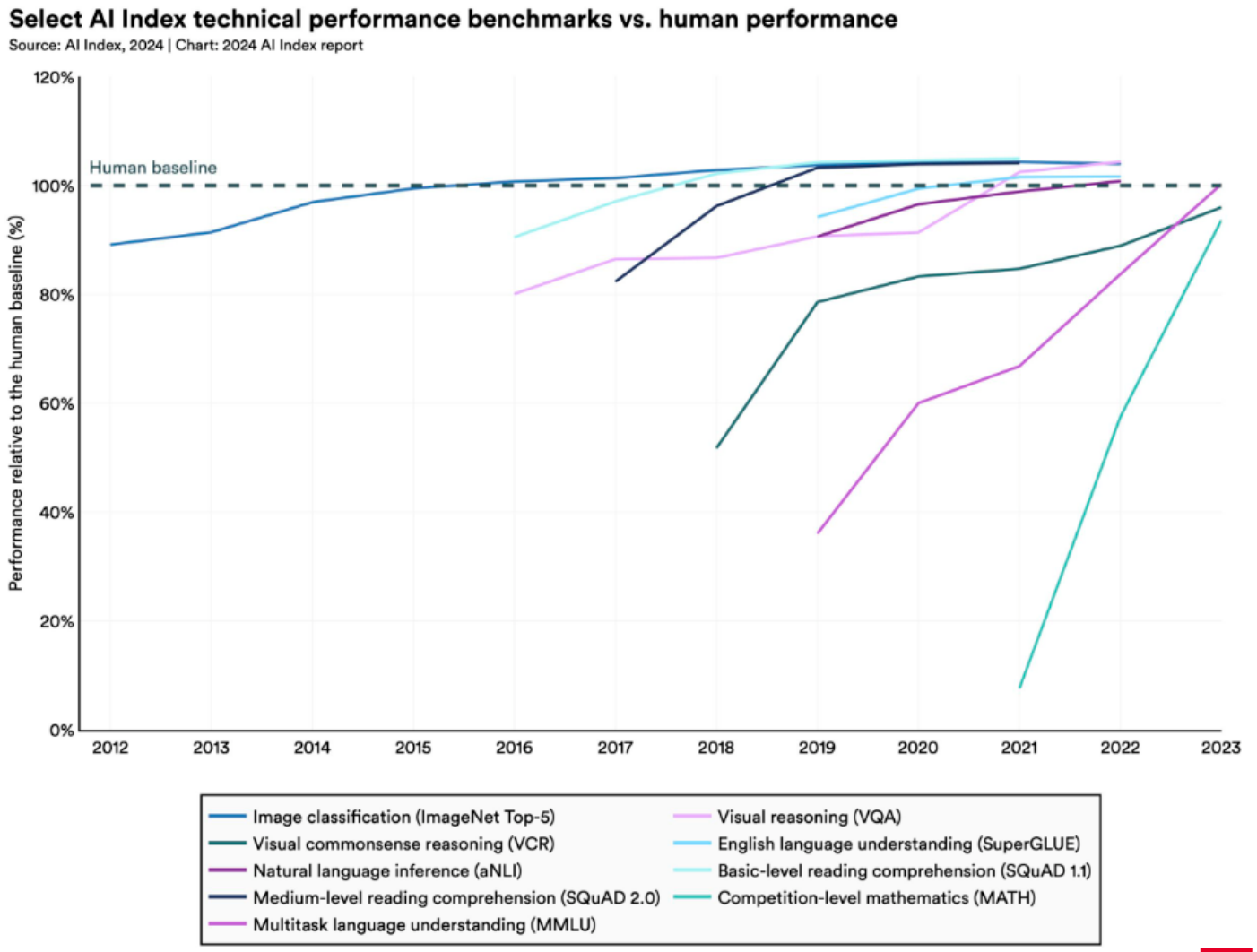
State-of-the-art



2021 AI Index Annual Report

RMIT UNIVERSITY

State-of-the-art, AI Index Annual Report 2024



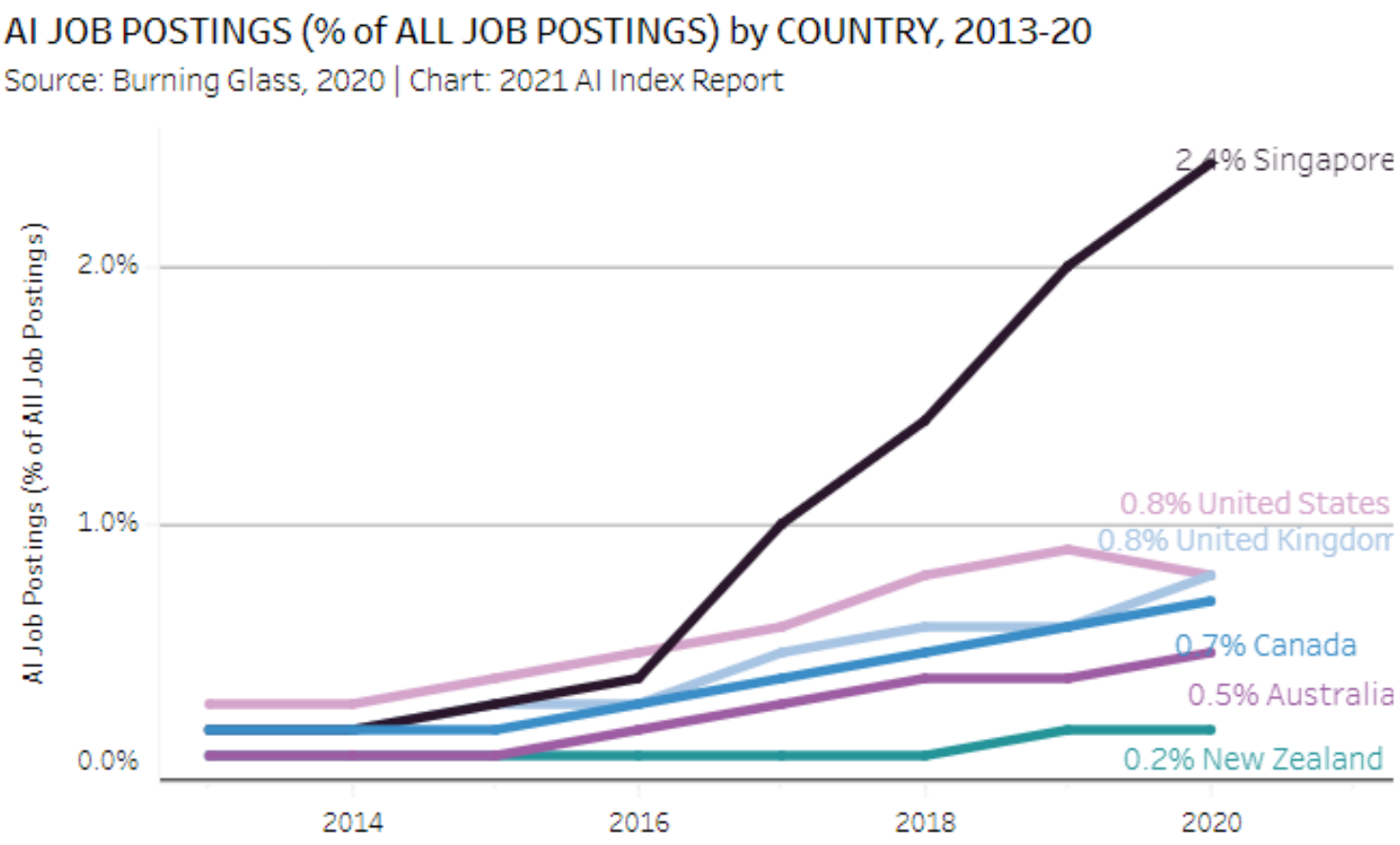
RMIT UNIVERSITY

What is the future of AI?

- McKinsey 5 charts
- AI Index Annual Report, 2024

RMIT UNIVERSITY

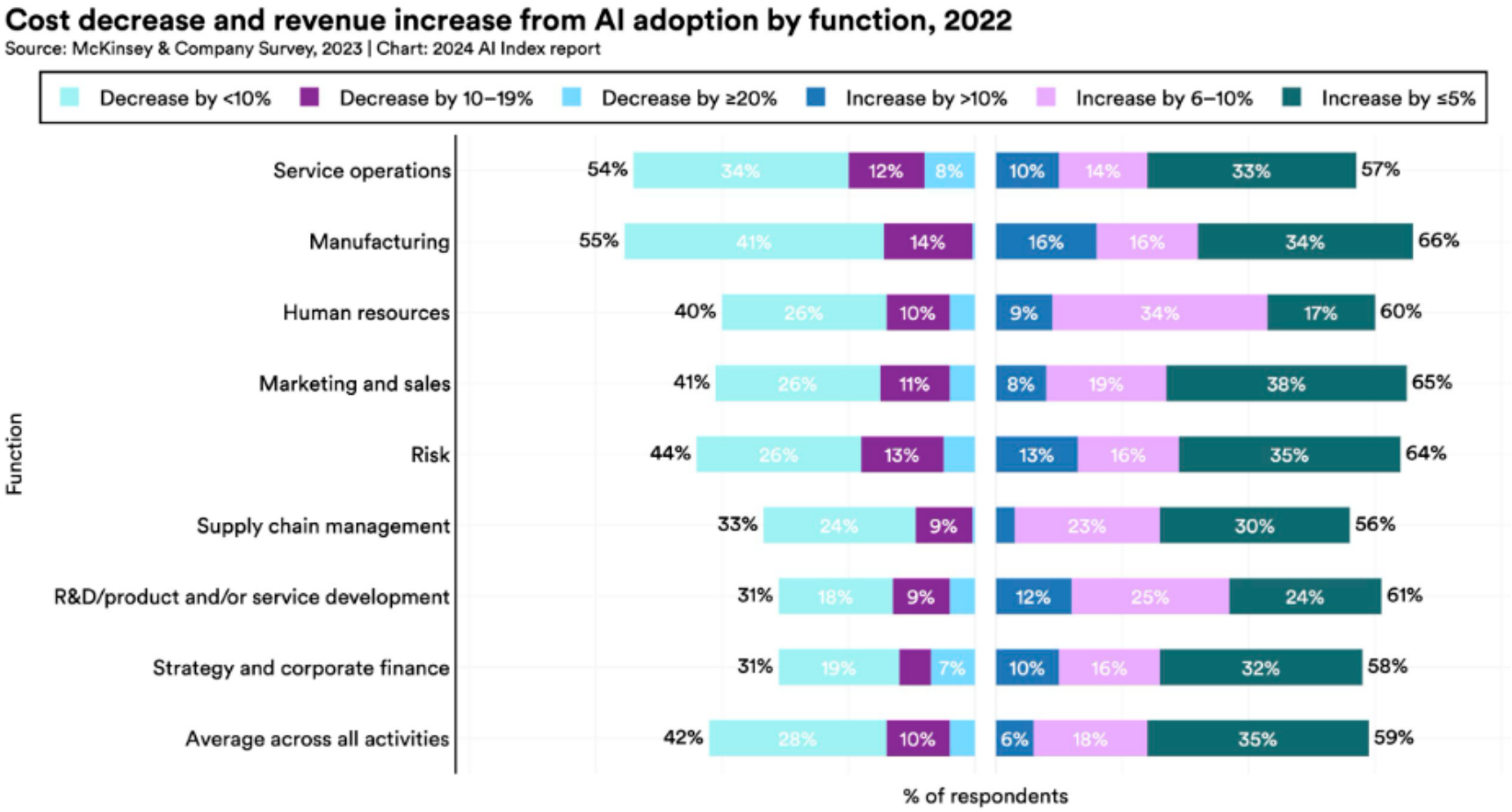
AI Job



2021 AI Index Annual Report

RMIT UNIVERSITY

AI Index Annual Report 2024

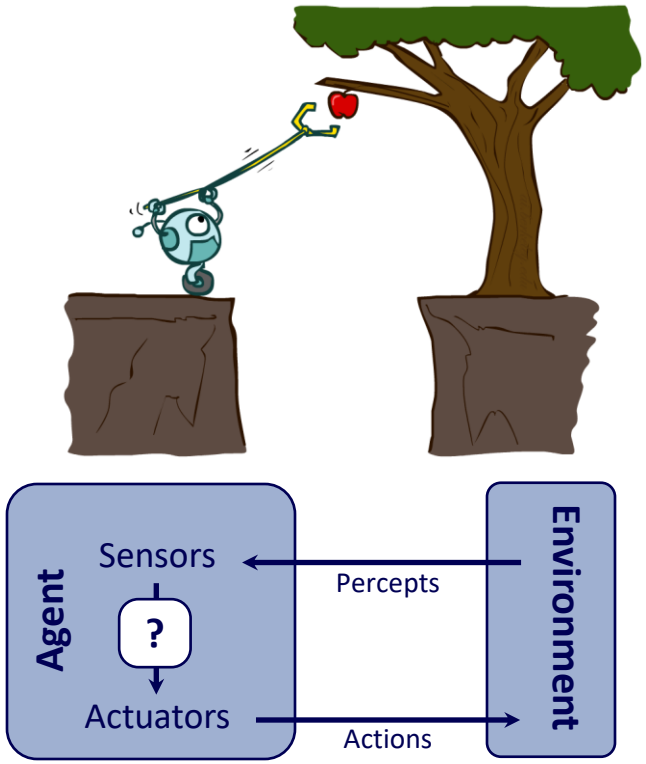


RMIT UNIVERSITY

Agent & Search

Designing Rational Agents

- An **agent** is an entity that *perceives* and *acts*.
- A **rational agent** selects actions that maximize its (expected) **utility**.
- Characteristics of the **percepts, environment,** and **action space** dictate techniques for selecting rational actions.

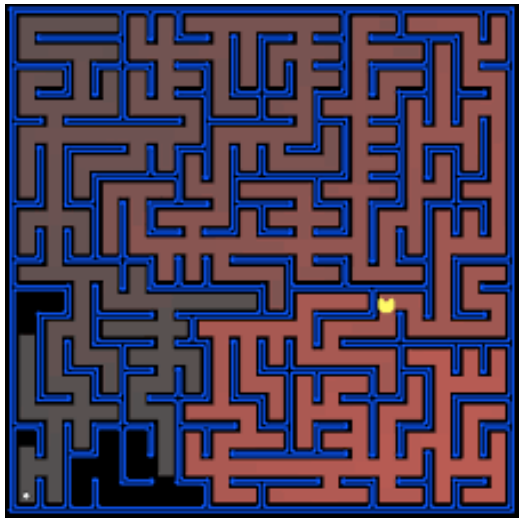


RMIT UNIVERSITY

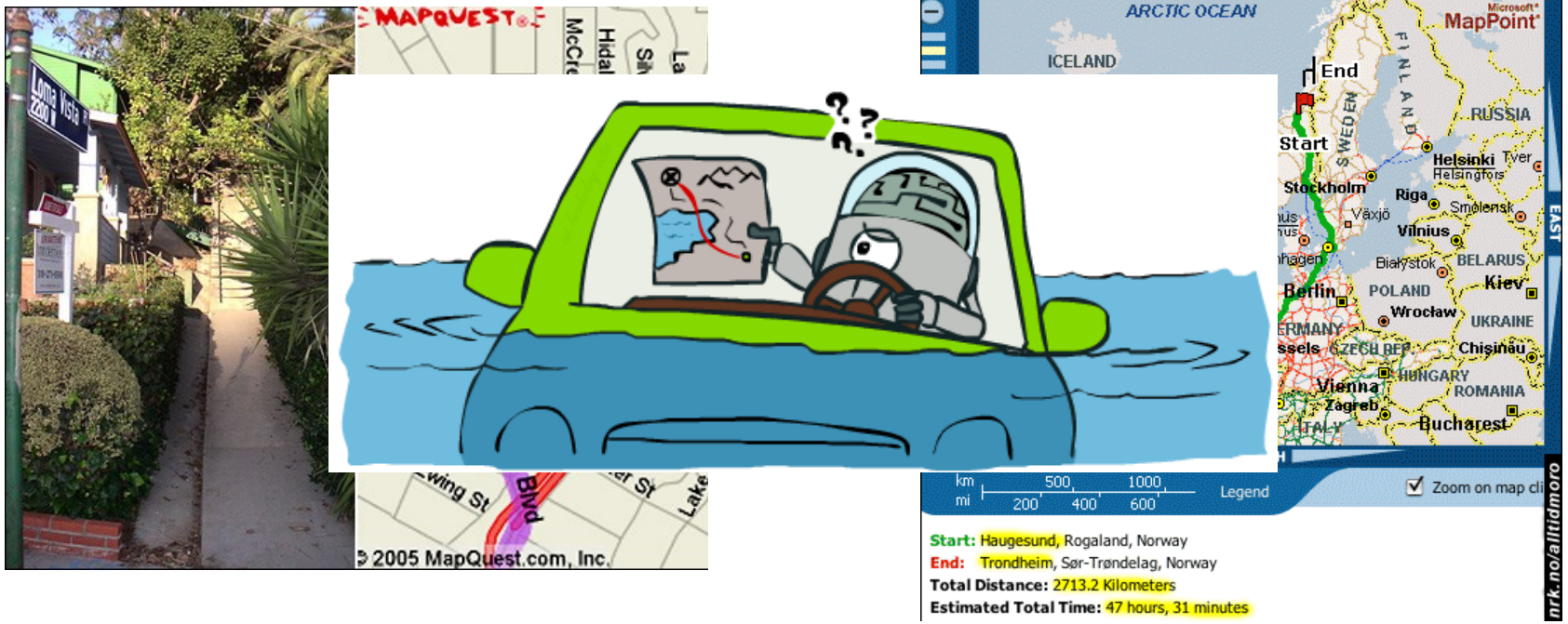
Search

Example: Pacman

- Goal:
  - Help Pac-man find his way through the maze
- Techniques:
  - Search: breadthfirst, depth-first, etc.
  - Heuristic Search: Best-first, A*, etc.



Search Gone Wrong?



RMIT UNIVERSITY

Course materials

- Book: Artificial Intelligence: A Modern Approach Russell & Norvig 4th global Pearson Ed
- Book: TOC of Artificial Intelligence: A Modern Approach, 4th Global ed
- Dev.: Python crash course

- More during the course.

Task

- Assign 0: Python Tutorial
  - Online, no grade
  - Start NOW!

- Assign 1: Search
  - Coming soon
  - Start early and ask questions.

Question?

RMIT UNIVERSITY