

Artificial Intelligence – An Introduction

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Outline

- What is Intelligence?
- What is AI?
- A sample search heuristic
- AI : Pros and Cons
- Takeaways

Intelligence

- What is intelligence?
- What happens when u are carrying 1 bucket of water.
- Intelligence is computation in the service of life, just as metabolism is chemistry in the service of life.

What is AI?

What is AI?

- It is about **Thinking**
- **Perception**
- And finally **Action**
- In this course; we talk about building models targeted at thinking, perception and action

What is AI?...

- AI is also about representations
 - that support making of these models
- What are representations?
 - “Farmer fox goose grain” example
- A farmer wishes to cross a river taking his fox, goose, and grain with him. He can use a boat which will accommodate only the farmer and one possession.
- If the fox is left alone with the goose, the goose is eaten. If the goose is left alone with the grain it will be eaten

AI Defined

AI refers to

- Algorithms/procedures enabled by
- constraints exposed by
- representations that support
- models targeted at
- thinking, perception and action.

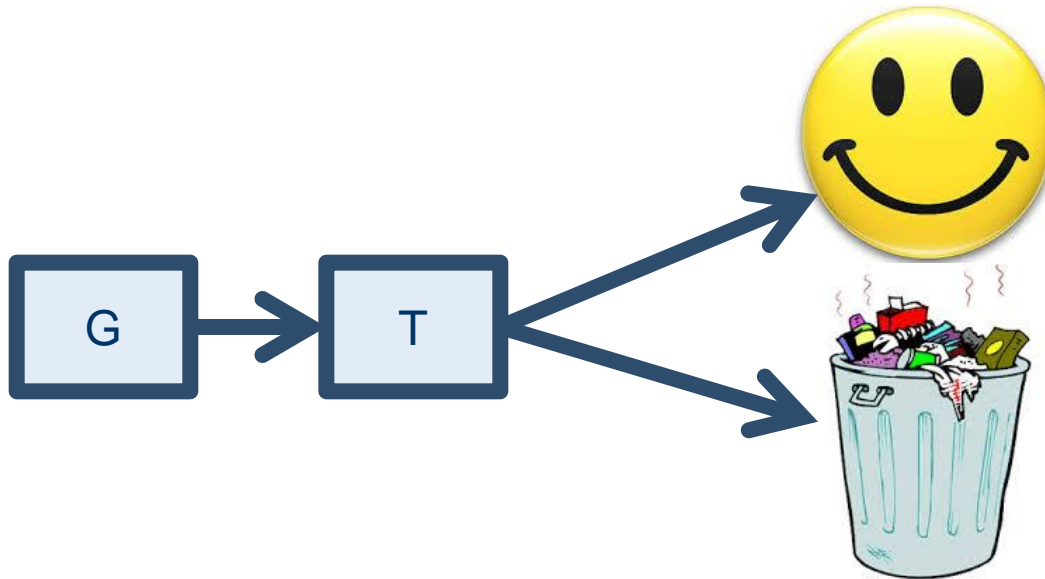
(by Dr. Patrick Winston, MIT)

Basis:

- The *strong AI* position is that any aspect of human intelligence could, in principle, be mechanized.

How Humans work?

- Example of a shade card – browsing through it.
- Generate and Test
- Generating all solutions and maybe u will get a solution



Improving on Generate and Test

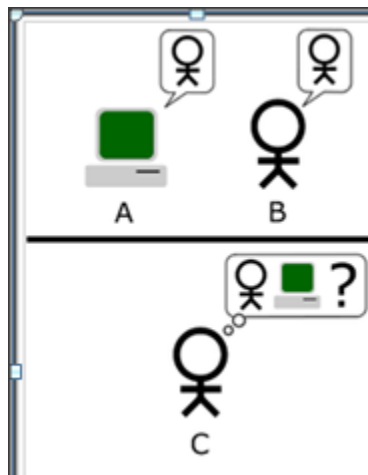
- Generators must not be redundant
- Informative
- Can you say it is trivial
- Difference between trivial and simple

Components of AI

- Represent
- Search
- Learn

History

- To make smarter programs
- 1842 - It will only do what it is asked to
- 1950s – Alan Turing
 - He helped win the World War II by breaking the enigma code



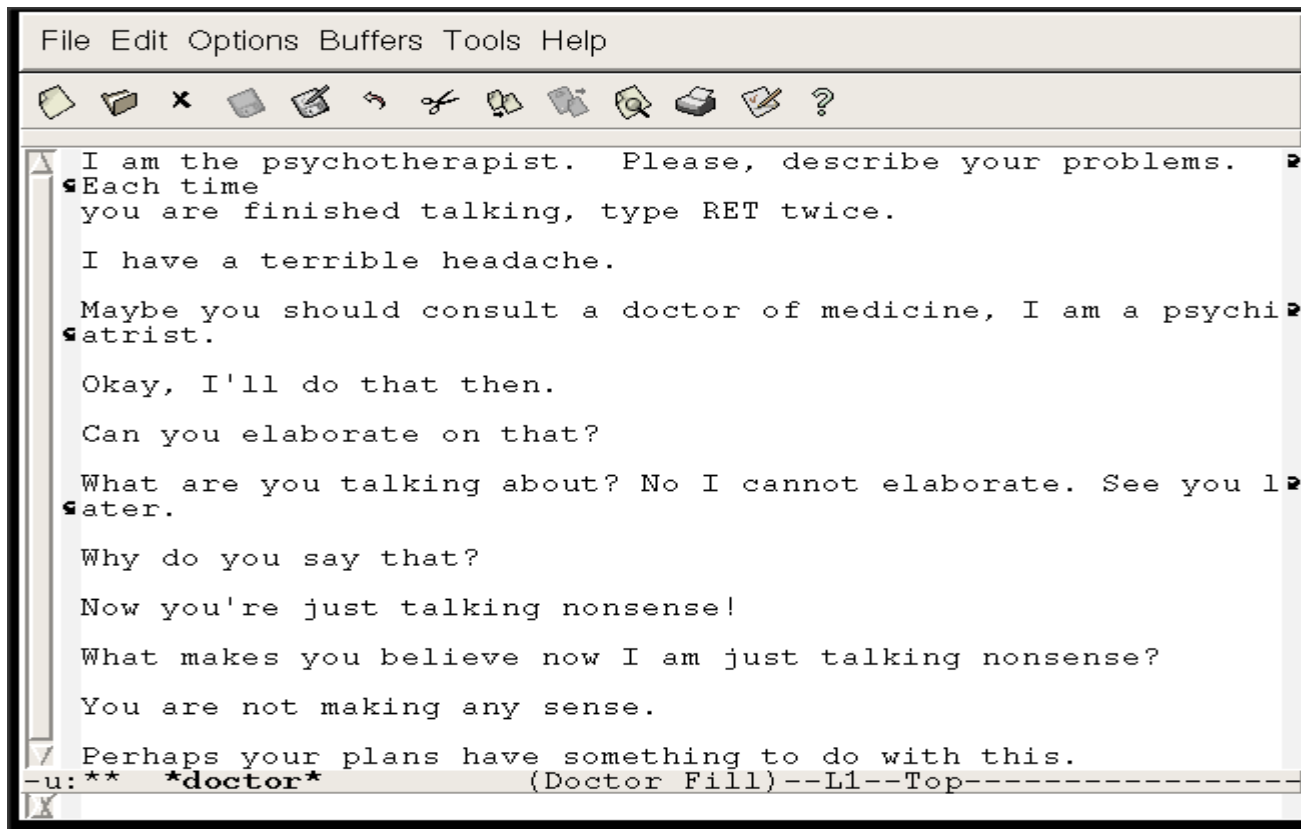
The "standard interpretation" of the Turing Test, in which player C, the interrogator, is given the task of trying to determine which player – A or B – is a computer and which is a human. The interrogator is limited to using the responses to written questions to make

History...

- (1960s) ELIZA is the example of one of the most primitive NLP by Joseph Weizenbaum
- Marvin Minsky – Foundation work in Artificial Neural Networks (1970s)
- Shakey the robot (1972)
- Rule based ES (1980s)
 - E.g. Delta airlines at the Atlanta airport



ELIZA example



The screenshot shows a classic ELIZA chat window. The title bar reads "File Edit Options Buffers Tools Help". Below the title bar is a toolbar with icons for file operations (new, open, save, print, etc.) and editing (undo, redo, cut, paste, etc.). The main text area contains the following dialogue:

```
I am the psychotherapist. Please, describe your problems.
Each time you are finished talking, type RET twice.

I have a terrible headache.

Maybe you should consult a doctor of medicine, I am a psychiatrist.

Okay, I'll do that then.

Can you elaborate on that?

What are you talking about? No I cannot elaborate. See you later.

Why do you say that?

Now you're just talking nonsense!

What makes you believe now I am just talking nonsense?

You are not making any sense.

Perhaps your plans have something to do with this.
-u: ** *doctor* (Doctor Fill)--L1--Top-----
```

The bottom of the window shows a status bar with the text "-u: ** *doctor* (Doctor Fill)--L1--Top-----".

History...

- 1986 Back-propagation algorithm : Neural networks become popular
- 2007-13 DARPA Urban challenge (autonomous driving in traffic)
- 2010 Siri speech recognition engine
- 2011 Watson wins quiz show Jeopardy
- 2014 Today's Watson is very different. It no longer exists solely within a wall of cabinets but is spread across a cloud of open-standard servers that run several hundred “instances” of the AI at once.

Current Market Scenario

- Last year alone more than \$2 billion was invested in 322 companies with AI-like technology.
- Facebook and Google have recruited researchers to join their in-house AI research teams. Yahoo, Intel, Dropbox, LinkedIn, Pinterest, and Twitter have all purchased AI companies since last year.
- Private investment in the AI sector has been expanding 62 percent a year on average for the past four years, a rate that is expected to continue.
- - Wired 2014 article.

Areas of Artificial Intelligence

- Perception
 - Machine vision
 - Speech understanding
 - Touch
- Robotics
- Natural Language Processing
- Expert Systems
- Machine Learning
- Game Playing

Pros - AI

- Reference:
(<http://ieet.org/index.php/IEET/more/nanderson20150617>)
- The talk was led by Google researcher, Mohamad Tarifi, PhD.
- “His speech focused on the fact that while many, like Sam Harris in his post on the AI apocalypse, warn us of the dire consequences of AI, there instead exists the possibility that artificial intelligence would most likely be more like a **Buddha or saint, than a tyrannical operating system hell bent on destroying humans.**

Pros – AI...

- Tarifi's theory hinged on two points:
- **1. AI would not live in a human body —the fear center for human beings.** Without fear, AI doesn't need to defeat us, rather **it would be naturally driven to do only one thing: more accurately discover the truth.**
- **2. Fear is the illusion of separation, which is the cause of all human suffering.** Lacking fear, AI would always be at one with everything it connected to, thus wanting to serve and provide rather than destroy.
- Tarifi even went so far as to suggest that **a fear of AI is merely a fear of one's own egoic tendencies.**

Pros – AI...

- To some, this may seem naïve and that the only way to keep AI from killing us is to program it to be good. But if we follow the logic above, that isn't necessary. **True learning AI will learn from its own experiences, which will be vastly different than ours.**
- **Could it be that we're the ones who hate ourselves, and our fear of AI, or any other intelligence other than our own, is simply a symptom of self-loathing?**

Cons - AI

- Reference:
<http://www.computerworld.com/article/2942599/emerging-technology/will-ai-drive-the-human-race-off-a-cliff.html>
- Hawking, who wrote *A Brief History of Time*, said in May that robots with artificial intelligence could outpace humans within the next 100 years. Late last year, he was even more blunt: "The development of full artificial intelligence could spell the end of the human race."
- Musk, CEO of SpaceX as well as CEO of electric car maker Tesla Motors, said A.I. threatens humans. "With artificial intelligence, we are summoning the demon,".

Cons – AI...

- "We are reaching a point where they are going to become a benefit to people. We'll have machines that will help people in their daily lives.... We need research on safety and coexistence. Machines shouldn't be outside the scope of human kind, but inside the scope of humankind. We'll have humans, dogs, cats and robots."
- Sharon Gaudin

Topics to be covered in my class

- AI: Search Techniques
 - Uninformed
 - Informed
- Fuzzy logic and systems
- Machine Learning
 - Supervised Learning
 - Regression
 - ANN

Attendance Rules!!!

Books

- AI
 - Artificial Intelligence: A modern approach
 - By Peter Norvig and Stuart J. Russell
- ML
 - Pattern Recognition and Machine Learning
 - By Christopher Bishop

Reference Links

- <http://www.cs.utexas.edu/~novak/cs381k3.html>
- <http://cse.iitk.ac.in/users/cs365/2013/readings/am-lecs-intro.pdf>
- <http://cs229.stanford.edu/materials.html>
- <http://intelligence.worldofcomputing.net/ai-search/heuristic-search.html#.VaX-Uvmqqko>

Tools and languages

- Prolog
- GNU Octave v/s Matlab
- Weka

Thank You