Mind, Computing Machinery and Intelligence
By A.M. Turing

Presentation for AI course by Koo sang jun
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About Alan Mathison Turing

- was born in 23. June 1912
- was died in 7. June 1954
- is Mathematician, Logician, Cryptanalyst, Computer Scientist
- is famous as inventor of Turing test in field of AI
Introduction of Imitation game

- Turing considers the question:

  Can machines think?

- The question is not easy to answer directly.
- Instead, he suggested the experiments with machines and humans.
- Can human distinguish which is which?
Introduction of Imitation game (continued)
Introduction of Imitation game (continued)
Q : Please write me a sonnet on the subject of the Porth Bridge.
A : Count me out on this one. I never could write poetry.
Q : Add 34957 to 70764 .
A : (Pause about 30 seconds and then give as answer)
   105621.
Q : Do you play chess ?
A : Yes.
Q : I have K at my K1, and no other pieces. You have only K at K6 and R at R1. It is your move. What do you play ?
A : (After a pause of 15 seconds) R-R8 mate.
This game replace the question

Can machines think?

with

Can machines do what we can do?
Discussions about digital machine

- To make argument clear, Turing restricted the term ‘machine’ to digital computers.
- It is imaginary discrete state machine that can deal with huge amount of states.
- The number of states should be sufficient to contain possible answers.

- Mind that first general computer was invented 1946, which is only four years past from this paper!
Discussions about digital machine (continued)
Objections to his opinion

- It was very sensational opinion and many objections were suggested.

- Turing introduced nine of them in his paper.
Objections to his opinion (continued)

- 1. Theological objection

  - Thinking is a function of soul which God gives to us
  
  - Machines do not have soul
  
  - Therefore, machines cannot think

  → Example of elephant
Objections to his opinion (continued)

2. ‘Heads in the Sands’ objection

““The consequences of machines thinking would be too dreadful. Let us hope and believe that they cannot do so."


Objections to his opinion (continued)

3. Mathematical objection

- By Gödel's incompleteness theorem, Answers from computer are limited.

- e.g) Halting Problem (Is program A eventually stop or not?)

→ Humans are too rigorous to faults of machines, while are generous to theirs.
Objections to his opinion (continued)

4. Argument from consciousness

Suggested by Professor Geoffrey Jefferson

"not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, could we agree that machine equals brain?"

→ Example of mind of ‘others’
→ Chinese room debate
Objections to his opinion (continued)

5. Argument from various disabilities

- Machines cannot do X
  - Mistake of machines
  - Self awareness of machines
  - Diversity in machine behavior
Objections to his opinion (continued)

6. Lady Lovelace’s objection

- Machine can only do what we order it to do

  → Example of context
  → Example of brain
Objections to his opinion (continued)

- 7. Argument from continuity in the nerve system
  - Brain is neither digital nor discrete state machine

    ➔ Substitution with digital computer.
Objections to his opinion (continued)

- 8. Argument from the informality of behavior
  - Behavior of machines are predictable while that of humans are not
    - Difficulty in prediction
    - Suspicion of law of behavior
Objections to his opinion (continued)

9. Argument from extra sensory perception

- Machines cannot perceive something requires extra sensory
  - Telepathy
  - Precognition ....
Summary

- Turing introduced the imitation game
- In this game, machine imitates human
- He imagined digital computer that can pass the test
- Many objections were made and nine objections were presented
Thanks you.