Q: Which of the following chatbots has been around for the longest time?

A. ChatGPT

B. Siri

C. ELIZA

D. Gemini

E. Claude

CPSC 100

Computational Thinking

Artificial Intelligence

Instructor: Parsa Rajabi
Department of Computer Science
University of British Columbia

Agenda

- Course Details Updates

- Chatbot + Intelligent Agents
- Foundations of AI
  - NLP

Artwork by
Koyah Morganbanke

Indigenous Students in STEM
January 2025 Welcome Lunch

January 22, 12–2pm
Sty-wet-tan Great Hall,
First Nations Longhouse

- Meet other Indigenous students, faculty, and staff

- Enjoy free lunch with a great group of people!

Register:

Learning Goals

Learning Goals

After this lecture, you should be able to:

- Explain the concept of **Intelligent Agents** + Chatbots
    - Describe the relevance of Turing Test to CT

- Explain the concept of **Natural Language Processing**
    - Describe the relevance of NLP to CT

- Identify and list the steps associated with traditional NLP

Project

- Project involves researching a specific topic, <u>details here</u>

    – **Deliverable: An infographic**

- To be done in groups

    – **Group members must be in the same lab section**

Deliverable	Weight	Due Date
Milestone 0 - Group Contract	-	Jan. 24
Milestone 1 - Proposal	5%	Feb. 12
Milestsone 2 - Data Inquiry	10%	Mar. 12
Milestone 3 - Infographic	10%	Apr. 7
Peer Evaluation	-	Apr. 8

Midterm Date (tentative)

- In-person exam

- To be done individually

- Based on lecture material, discussions, labs etc.

- **Tentative: Friday, February 14 at 3pm**

CPSC 100 AI Policy

Class Activity

Class Activity: Course AI Policy

As a class, let's identify where AI can or can not be used in a responsible and effective way.

In groups of 2-3, brainstorm ideas on the Miro Board - be ready to share!

http://tiny.cc/100-W2A

Class Activity Results

Relying entirely on AI

Failing to cite usage

Copy/paste answers

Creative Applications

Improve Learning

Support in Writing
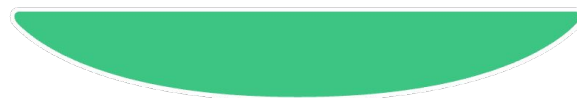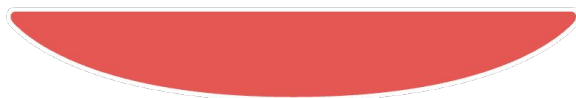
Unacceptable Use Cases

Acceptable Use Cases

Balancing AI Use in Education

*Graphics made using NapkinAI

Efficiency and Productivity

Time-saving on tasks

Workflow improvement

Personal tutoring

Tools for disabilities

Accessibility and Inclusion

Learning and Development Risks

Over-reliance on AI

Incomplete understanding

Misuse of information

Privacy violations

Ethical and Privacy Concerns

Balancing AI's Benefits and Risks

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CPSC 100 - AI Policy

- AI-usage will be **inevitable**

- I view AI tools as a powerful resource

  – Learn to embrace!

- Using AI tools is permitted for the following

  – Labs

  – Post-class quizzes

  – Project

- … but **there is a catch**!

CPSC 100 - AI Policy

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- … but **there is a catch**!

No AI usage allowed for:

- Midterm
- Final Exam

CPSC 100 - AI Policy

- You have to disclosure your AI usage to us

- Depending on the submission:

  – AI Disclosure **statement** (quizzes, some labs)

  🟢 Entirely by myself, no contribution from AI

  🟡 Mostly by myself, some contribution by AI

  🟠 Evenly split between myself and AI

  🟣 Mostly by AI, some contribution by myself

  ⚠️ Entirely by AI, no contribution from myself

  – AI Disclosure **form** (project, some labs)

  Series of reflection questions on your usage

CPSC 100 - AI Policy

- There are risks
  - Sensitive Data
  - Overly dependent
- YOU are responsible
  - For every submission you made
- Remember, other students are using the same tool
  - "AI wrote it", "I took it from ChatGPT", etc.
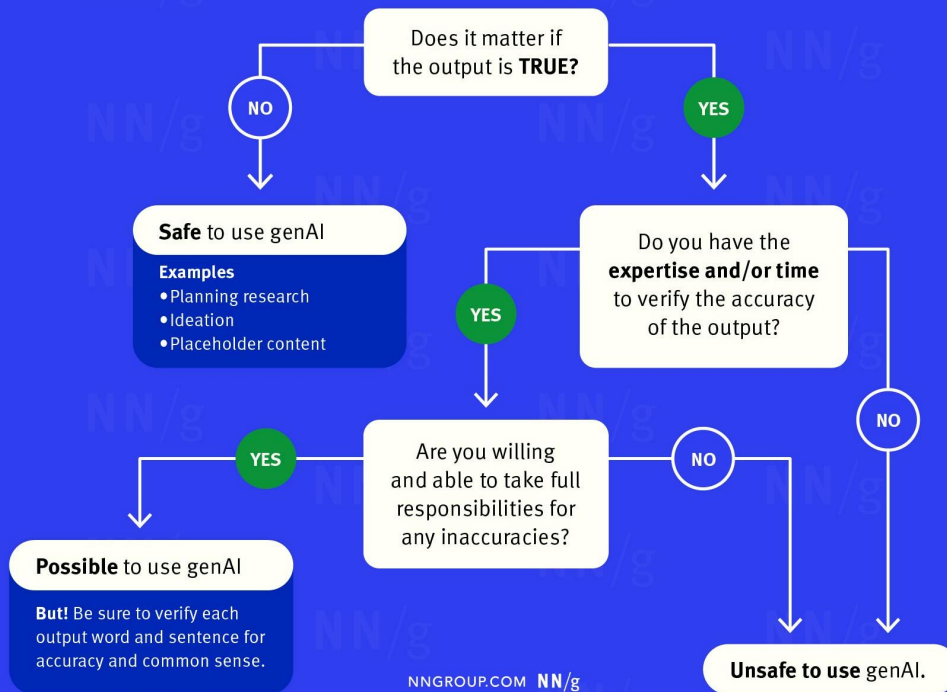 - Not an excuse for plagiarism

CPSC 100 - AI Policy

- Using vs Not using

  - **It is your decision, either is valid**

- Marking

  - You will not be marked "up" or marked "down" for using or NOT using it

- Your submissions will be carefully reviewed for plagiarism regardless of usage

CPSC 100 - AI Policy

- Teaching team will conduct regular audits of random students' AI disclosures

  – Scheduled interviews with TAs + instructor

  – Cross-reference submitted work

  – More detailed audits/interviews for project submission

- Students must demonstrate understanding of project

  – **Be transparent and truthful!**

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Is It Safe to Use GenAI for This Task?

Adapted from a graphic by Aleksandr Tuilkanov

Does it matter if the output is TRUE?

NO → **Safe** to use genAI

Examples
- Planning research
- Ideation
- Placeholder content

YES → Do you have the **expertise and/or time** to verify the accuracy of the output?

YES → Are you willing and able to take full responsibilities for any inaccuracies?

YES → **Possible** to use genAI

But! Be sure to verify each output word and sentence for accuracy and common sense.

NO → **Unsafe to use** genAI.

NO → **Unsafe to use** genAI.

NNGROUP.COM NN/g

Chatbot

A **chatbot** is a software or computer program simulating human conversation. It can be powered by various technologies, ranging from basic decision tree algorithms to advanced conversational AI, and can operate through text or voice interactions.

Intelligent Agents

What does it mean for a machine to be intelligent?

Turing Test

The test doesn't care whether a machine is intelligent or not; it cares whether a machine acts like. it's intelligent.

Turing Test

- "I propose to consider the question, "Can machines think?" The problem can be described in terms of the 'imitation game'.

- "I believe that in about **fifty years' time** it will be possible to programme computers to make them play the imitation game so well that an average **interrogator will not have more than 70 percent chance of making the right identification after five minutes of questioning.**"– Alan Turing, 1950.

Foundations of AI

Foundations of AI/ChatGPT

- **Natural Language Processing (NLP)**: ChatGPT's primary function is to process and generate human language, which is the core of NLP. It uses advanced NLP techniques to understand context, generate responses, and maintain coherent conversations.

- **Machine Learning (ML)**: It utilizes the transformer model, a deep learning technique, to train on extensive text data. This enables ChatGPT to learn language patterns and context, thus generating coherent, context-aware responses.

How does NLP work?

NLP in a nutshell

- NLP is challenging!

- NLP draws on many disciplines: linguistics, cognitive science, psychology, logic, computer science, philosophy, engineering..

- **Traditional approach**: Long list of rules for processing language, formulated by people and programmed into computers

- **Modern approach**: Machines learn from text examples using artificial neural networks and similar approaches. Statistical methods allows to compare different interpretations

Traditional NLP Steps

1. **Recognize speech** (typically chatbots receive ASCII versions of the questions)

2. **Syntax analysis,or parsing**: inferring parts of speech and sentence structure, using a lexicon and grammar

3. **Semantic analysis**: inferring meaning using syntax and semantic rules

4. **Pragmatics**: inferring meaning from contextual information

(1) Input: Sentence: "The rat ate cheese"

(2) Lexicon:

rat	Noun
cheese	Noun
ate	Verb
The	Article
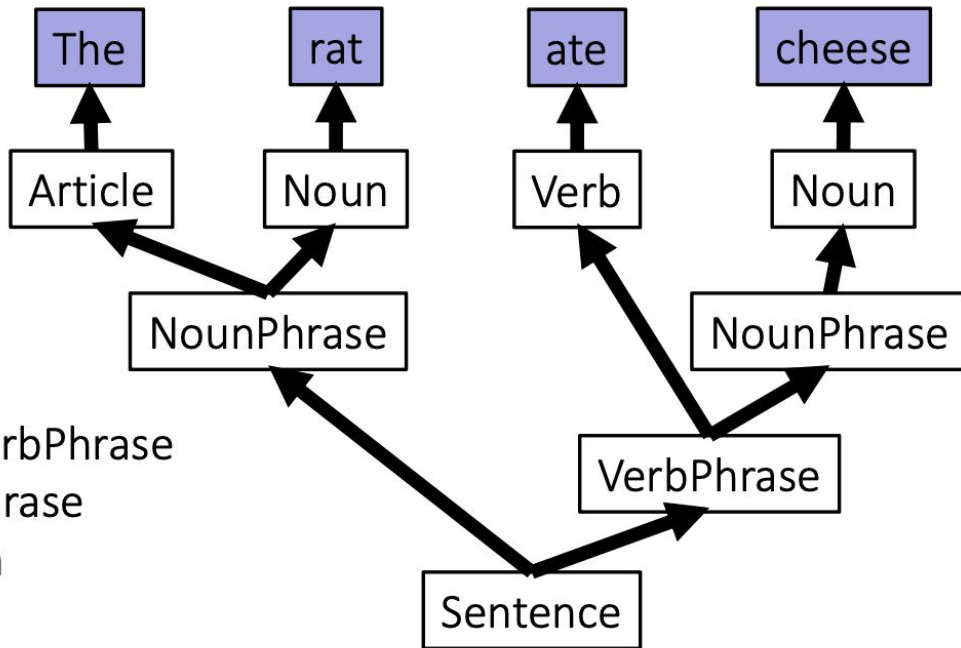
(3) Grammar:
Sentence → NounPhrase, VerbPhrase
VerbPhrase → Verb, NounPhrase
NounPhrase → Article, Noun
NounPhrase → Noun

(4) Output: A parse tree:

Q: Which skill is the most applicable in step 3 (Grammer)?

iClicker

A. Abstraction

B. Decomposition

C. Synthesis

D. Simulation

E. Modelling

Wrap up

Parsing is the basis for programming

• A computer has to "**understand**" programs in order to execute them

• Programming languages are designed so that they can be parsed

unambiguously

• A grammar specifies all the possible programs that can be written in a language

• **Designing programming** languages (and their grammars) is a fun and important part of computer science

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Wrap Up

- Complete group contract by Jan 24
  - Find group members in your lab

Take Home Slides

Early Chatbots - Explained

- **ELIZA** (1960s): mimicked a psychotherapist using pattern-matching for conversation.

- **PARRY** (1970s): simulated a patient with paranoid schizophrenia, showing a complex behavioral model than other models.

- **Jabberwacky** (1980s): Aimed to mimic natural human conversation with an emphasis on humor, context sensitivity, and learning

- **ALICE** (1990s): utilized AIML for heuristic conversations, emerging as an advanced early chatbot.

- **Cleverbot** (2000s):Learns from previous interactions, using a large conversation database for human-like, varied, and engaging responses.

Daniel Denntt on Turing Test

[Turing meant it] as a thought experiment that should convince people, that ... any computer that could pass this test, fair-and-square, of course it would be intelligent!"
[Video]

Only concerned with whether a machine behaves intelligently

In addition, intelligence (circa Turing) is whether the machine can converse