Slides for Pre-reading

Slides with yellow borders will not be covered in class, but is still testable content - you should review this before class.

CPSC 100

Computational Thinking

Generative Artificial Intelligence

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

Agenda

- Recap Classification
- Generative AI
  - Background
  - Class Activity

Steps to do Classification

Step 1: Start with the data you have

Applicant	Annual Income	Loan Approved?
#1	26 000	No
#2	60 000	Yes
#3	50 000	Yes
#4	47 000	No
#5	12 000	No
#6	108 000	Yes

Step 2: Split data into training and test sets

We chose a 50/50 split for our demo but you could do other splits like 60/40, 70/30. For large datasets, 80/20 split is used

Applicant	Annual Income	Loan Approved?
#1	26 000	No
#2	60 000	Yes
#3	50 000	Yes

} **Training Data**

Applicant	Annual Income	Loan Approved?
#4	47 000	No
#5	12 000	No
#6	108 000	Yes

} **Test Data**

Step 3: Build classifier

(i.e., Find pattern in training set)

Given your training data, can you find a pattern that can tell you when to approve a loan?

Earlier, we decided an annual income of ~$50,000 seemed Like a good cut off point. **That was a classifier!**

Applicant	Annual Income	Loan Approved?
#1	26 000	No
#2	60 000	Yes
#3	50 000	Yes

} **Training Data**

Step 4: Use classifier on test data

Applicant	Annual Income	Loan Approved?
#4	47 000	?
#5	12 000	?
#6	108 000	?

} **Test Data**

After you come up with a classifier that seems to do okay with your training data, you use it on your test data to see what kinds of decisions it makes.

Step 5: Calculate Accuracy

Applicant	Annual Income	Loan Approved?	Classifier said to…
#4	47 000	No	No
#5	12 000	No	No
#6	108 000	Yes	Yes

} **Test Data**

If the results of your classifier match up with the decisions you've made in your test data, it's looking good.

You can start trying to use it on data that you haven't made any decisions on yet.

Seems Straightforward

- What happens when we have more than one attribute?
- In the example before, we only had to consider annual income
- But what would happen if we had multiple attributes, like 5 or 10 or 100?
- **How do we decide which attribute to use?**

Seems Straightforward

- What happens when we have more than one attribute?
- In the example before, we only had to consider annual income
- But what would happen if we had multiple attributes, like 5 or 10 or 100?
- **How do we decide which attribute to use?**

Decision Trees!

Seems Straightforward

- What happens when we have more than one attribute?
- In the example before, we only had to consider annual income
- But what would happen if we had multiple attributes, like 5 or 10 or 100?
- **How do we decide which attribute to use?**

Decision Trees!

(next class!)

Learning Goals

Learning Goals

After this lecture, you should be able to:

- Explain the concept of **Generative** **A**rtificial **I**ntelligence
  - Describe the relevance of Generative AI in CPSC 100
- Identify and list various GenAI tools to date
- Identify opportunities to use and not use GenAI
- Develop a classroom AI policy

Generative AI

Generative AI

What does Generative mean?

Generative refers to systems, models, or algorithms designed to **create or produce new data** that **resembles the input data** on which they were trained.

Generative AI

What does AI mean?

Artificial Intelligence (AI), which refers to the **simulation of human intelligence** in machines that are programmed to think, reason, learn, and **act in a way** that mimics human cognitive abilities

Background Information

Hello ChatGPT!

- Previous conversational chatbots (~1960-2000s)
- ELIZA[1], PARRY[2], A.L.I.C.E.[3] & Cleverbot [4]
- Rise of ChatGPT-3.5 in November 2022
  - Chat **G**enerative **P**re-trained **T**ransformer
- Wide range of capabilities
  - Human-like responses [5]
  - Understanding conversation context [6]
  - Writing code & debugging [7]

Chatbots are NOT new!

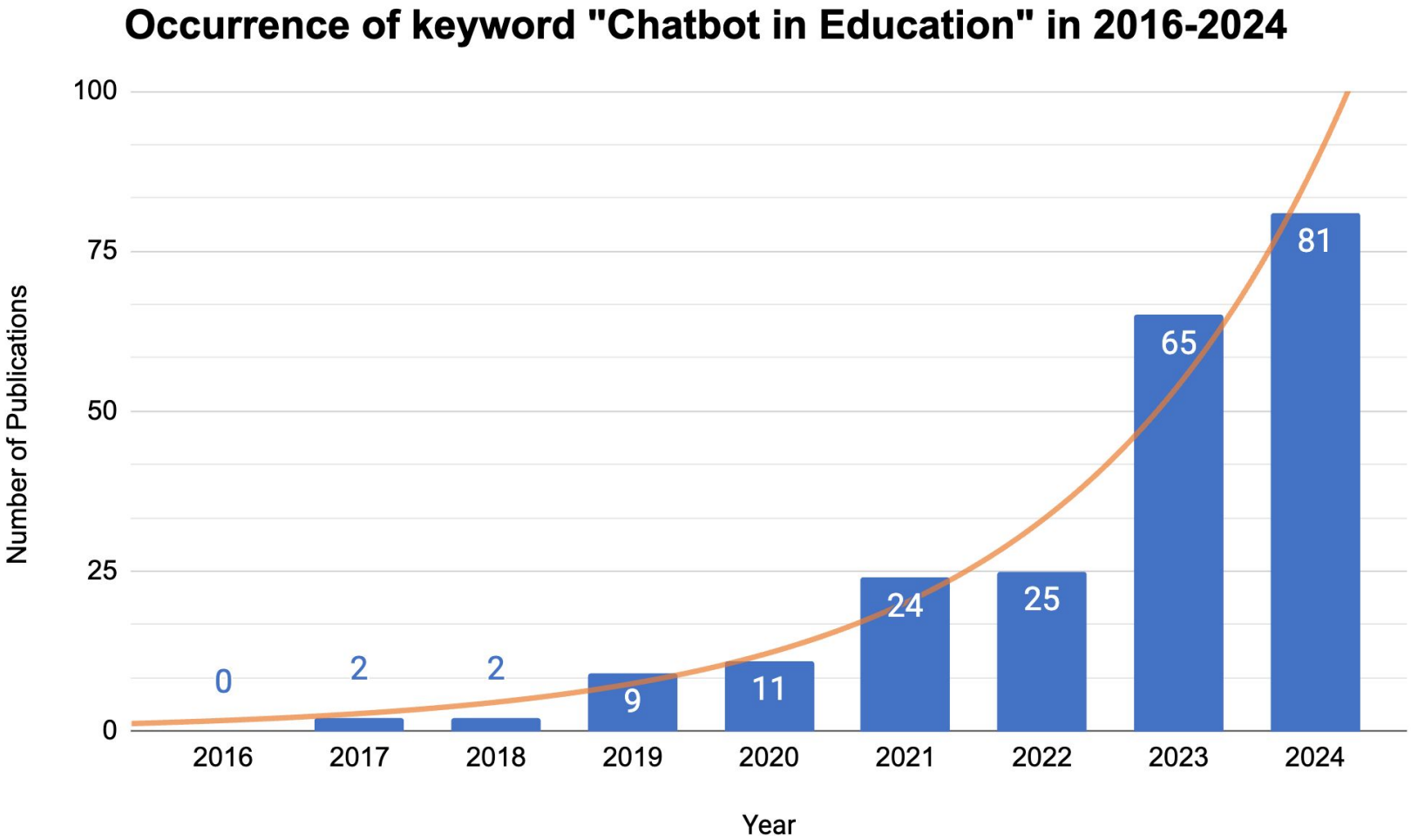
Unleashing the Potential of Chatbots in Education: A State-Of-The-Art Analysis

Rainer Winkler and Matthias Soellner March 2018

psychology literature before examining and individually coding a relevant subset of 80 articles.

The results show that chatbots are in the very beginning of entering education. Few studies suggest

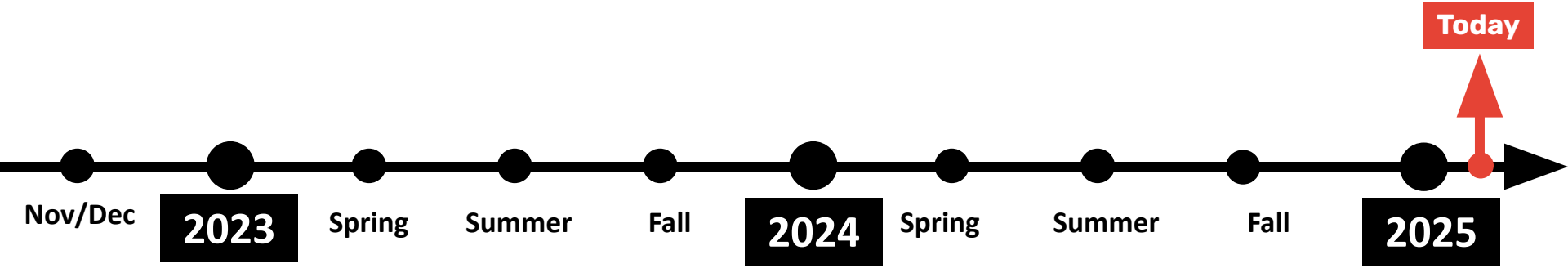
the potential of chatbots for improving learning processes and outcomes. Nevertheless, past


Occurrence of keyword "Chatbot in Education" in 2016-2024
Number of Publications
100
75
50
25
0
0
2
2
9
11
24
25
65
81
2016
2017
2018
2019
2020
2021
2022
2023
2024
Year

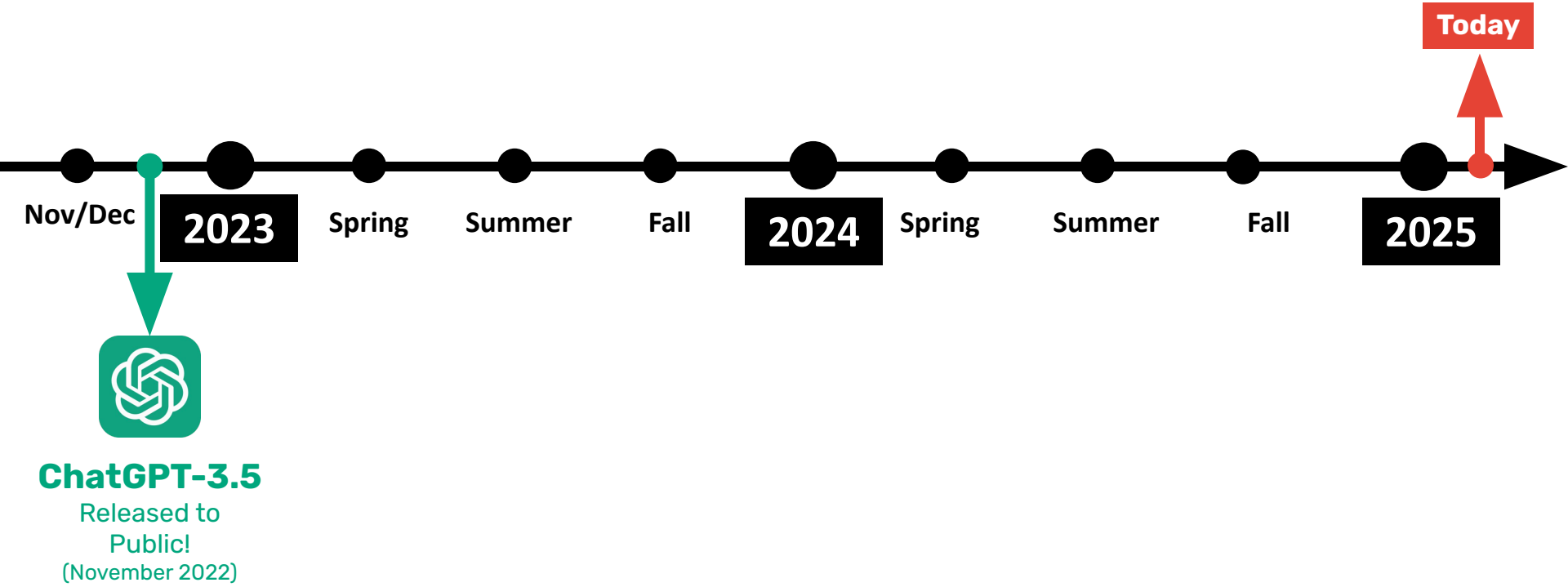
Timeline

Timeline

Timeline



Timeline


Today
Nov/Dec
2023
Spring
Summer
Fall
2024
Spring
Summer
Fall
2025
ChatGPT-3.5
Released to Public!
(November 2022)

Timeline

GPT-4
(March 2023)

Today

Nov/Dec | 2023 | Spring | Summer | Fall | 2024 | Spring | Summer | Fall | 2025

ChatGPT-3.5
Released to Public!
(November 2022)

Timeline

GPT-4
(March 2023)

Gemini
(Dec 2023)

Today

Nov/Dec | 2023 | Spring | Summer | Fall | 2024 | Spring | Summer | Fall | 2025

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Timeline

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(March 2023)

Gemini
(Dec 2023)

Today

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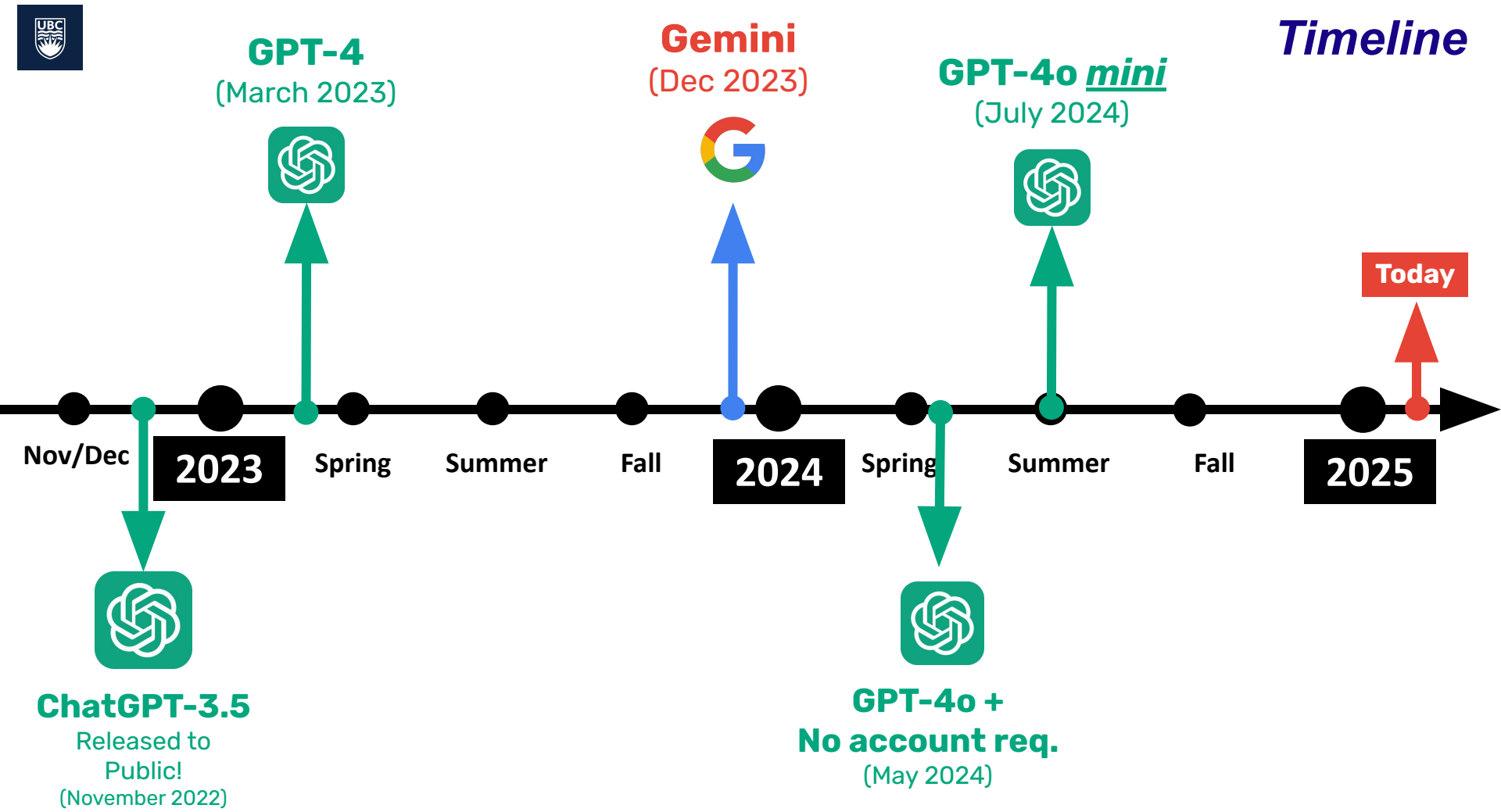
GPT-4o +
No account req.
(May 2024)

Timeline


GPT-4
(March 2023)
Gemini
(Dec 2023)
GPT-4o mini
(July 2024)
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Fall
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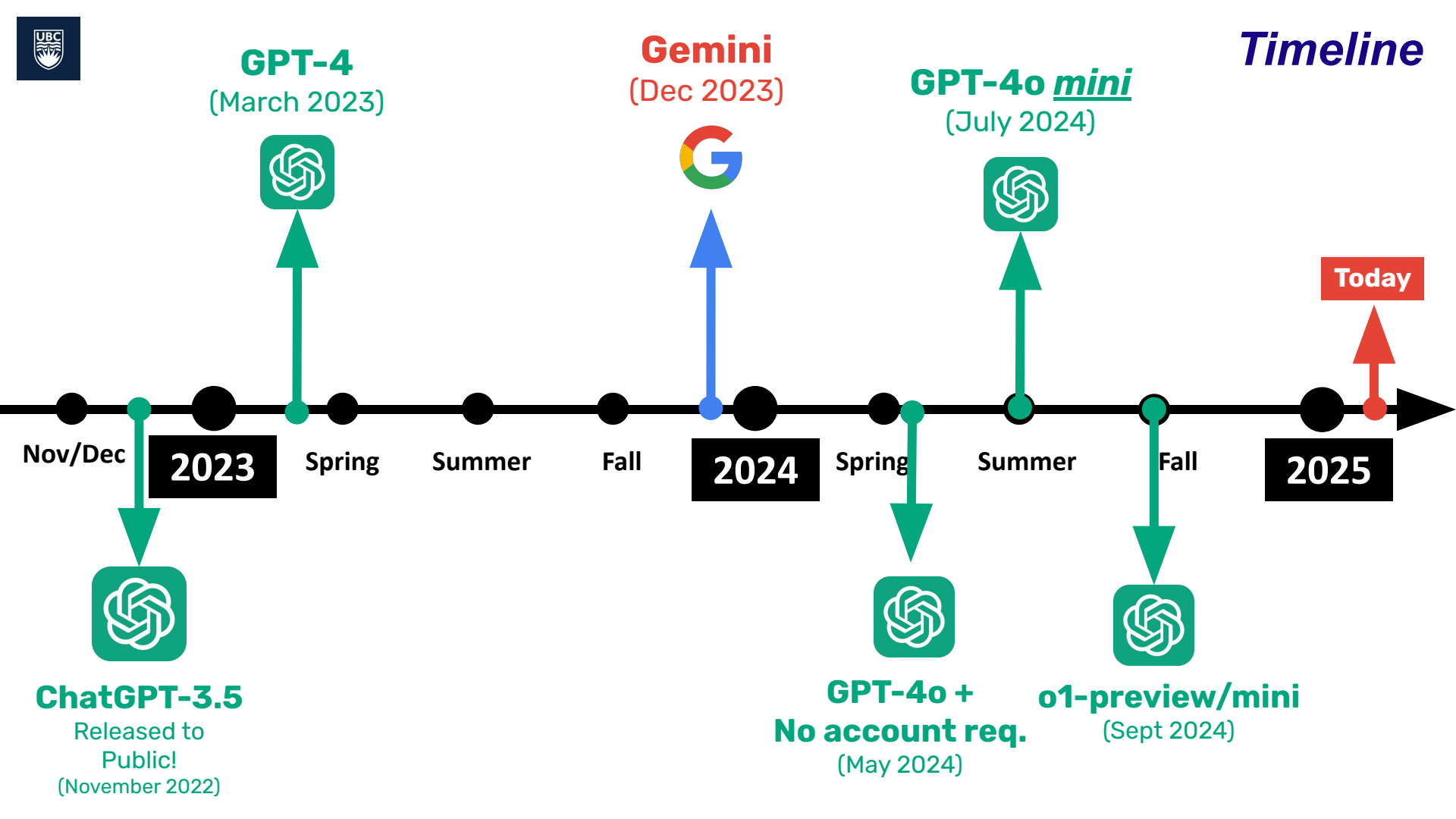
Timeline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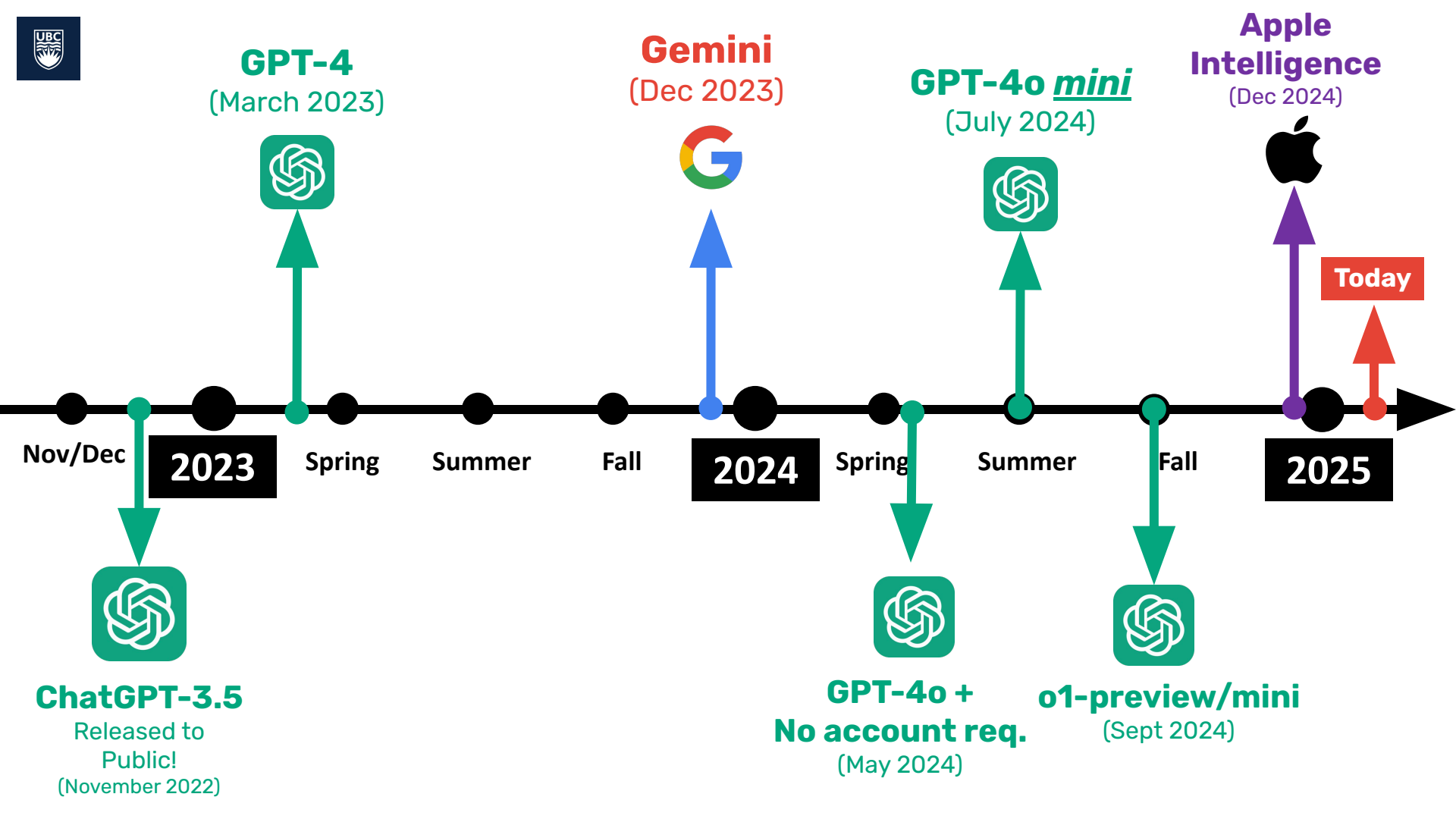
o1-preview/mini
(Sept 2024)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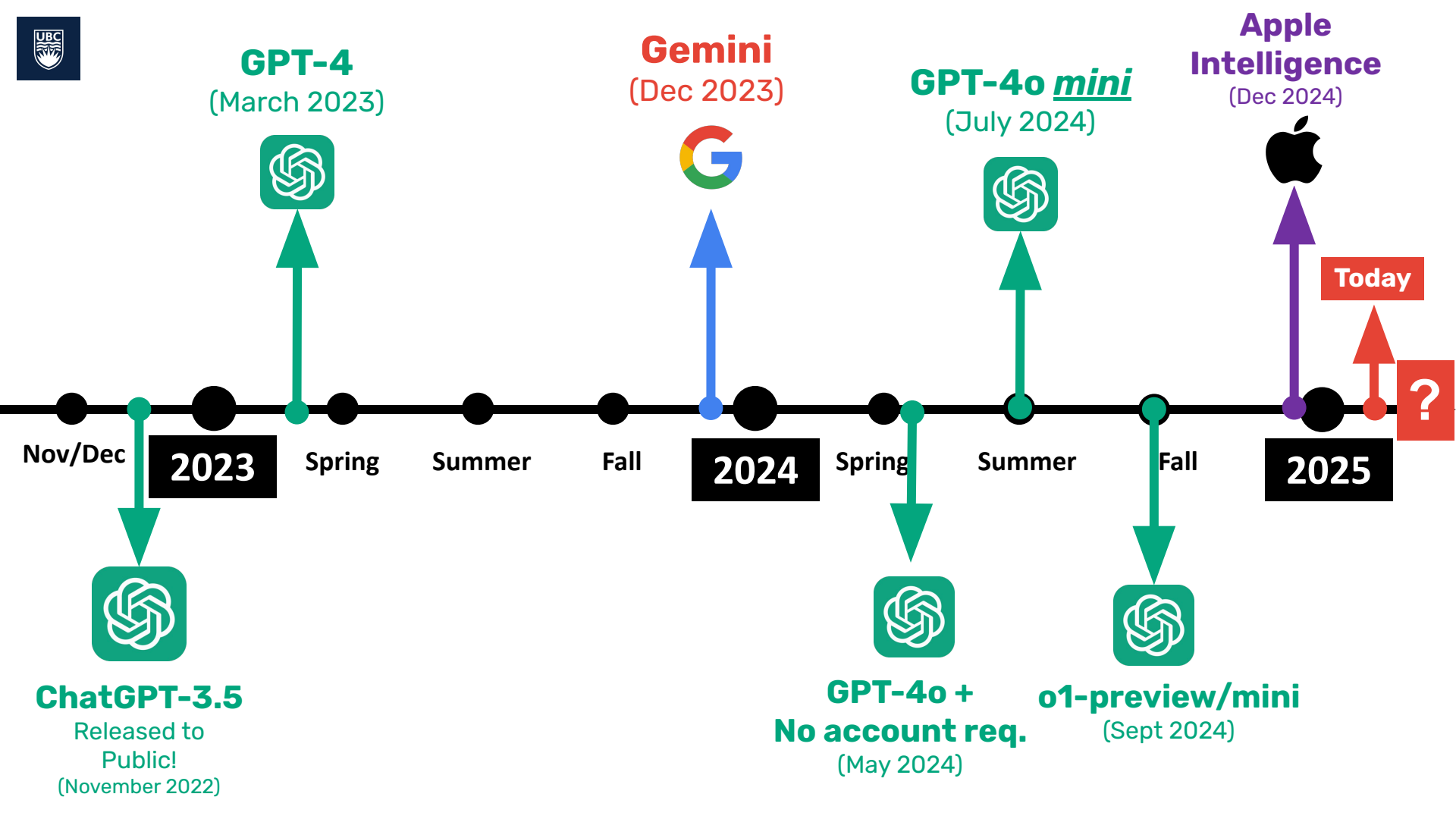
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CPSC 100 AI Policy

Class Activity

Class Discussion

Wrap up