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Using Generative AI for Teaching and Research

Keynote at Professional Development event at
POLITÉCNICO DO PORTO. INSTITUTO SUPERIOR DE CONTABILIDADE E ADMINISTRAÇÃO DO PORTO

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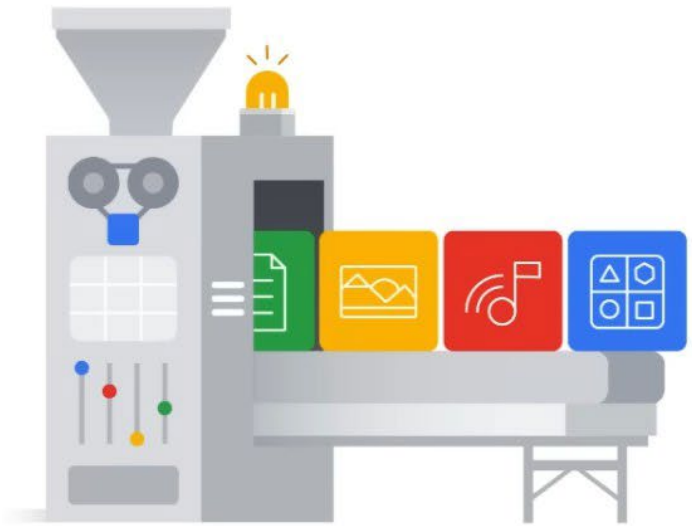
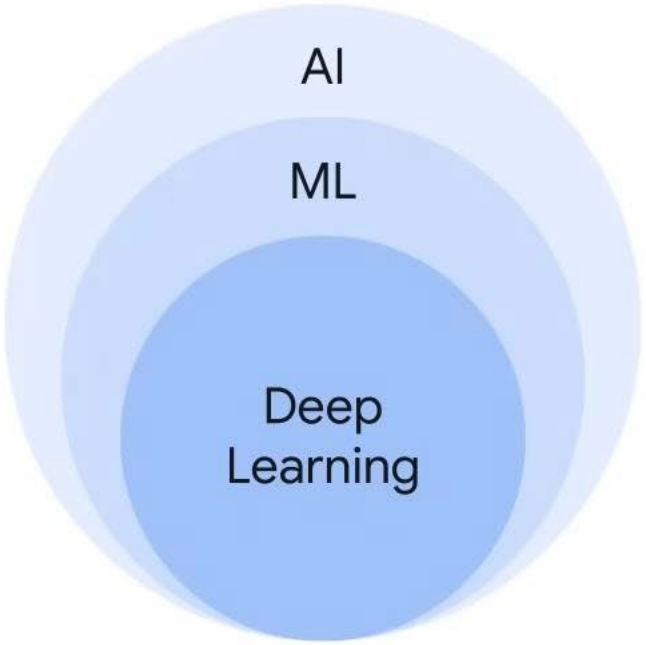
Professor of International Education

EQUIS ACCREDITED
AACSB ACCREDITED
SMALL BUSINESS CHARTER
EFMD ACCREDITED | BA
PRME CHAMPIONS Principles for Responsible Management Education



What is Generative AI?

- GenAI is a type of Artificial Intelligence that creates new content based on what it has learned from existing content.
- The process of learning from existing content is called training and results in the creation of a statistical model.
- When given a prompt, GenAI uses this statistical model to predict what an expected response might be–and this generates new content.



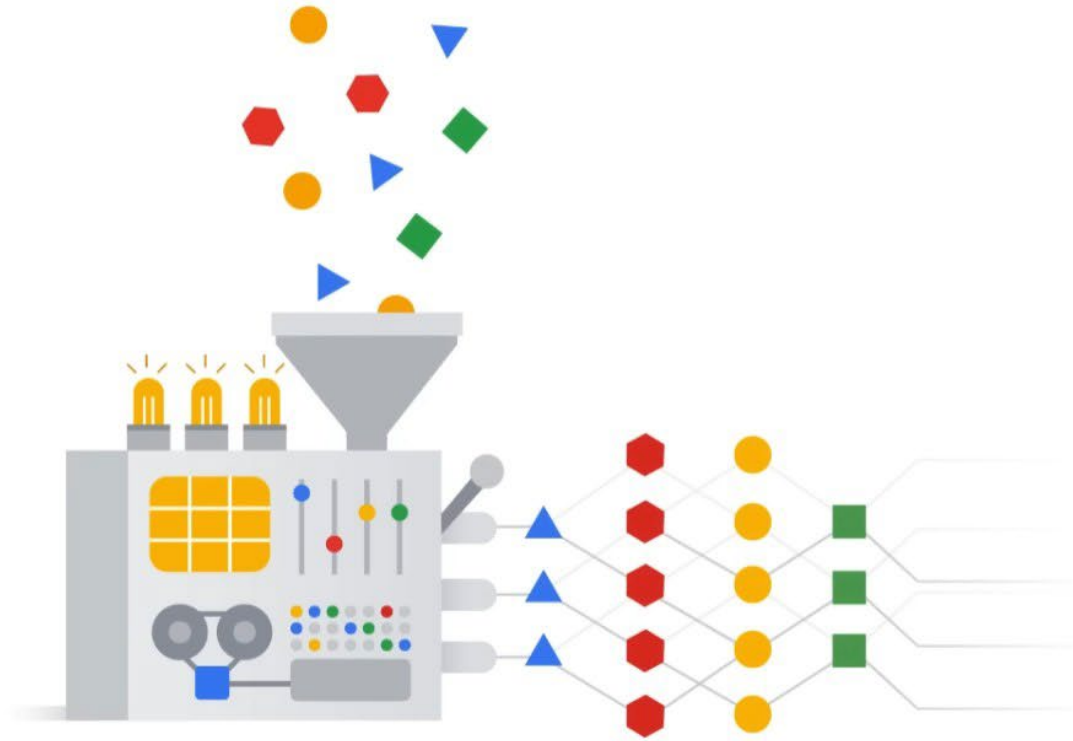
Artificial Intelligence

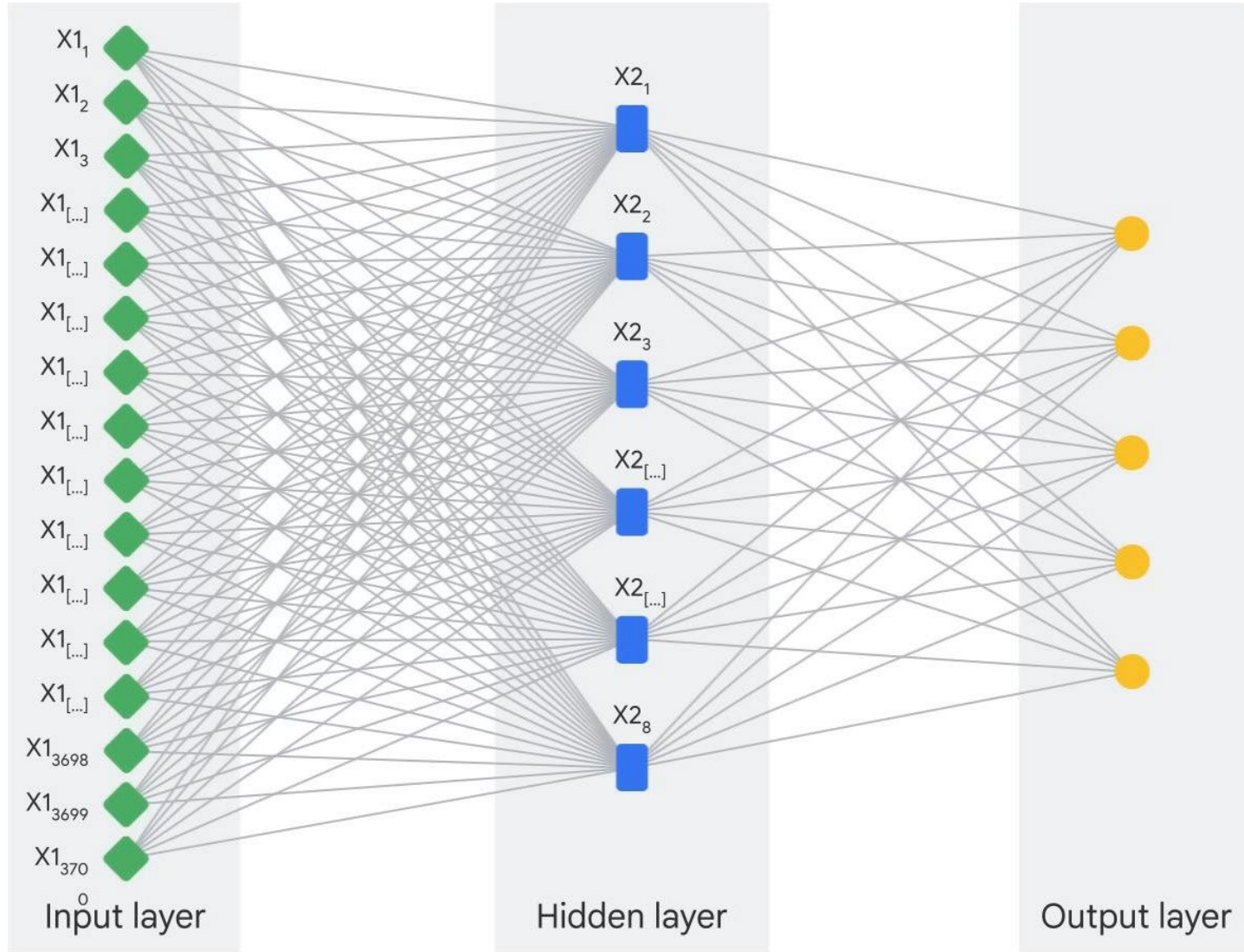
is a discipline

Machine Learning

is a subfield

Deep learning uses Artificial Neural Networks - allowing them to process more complex patterns than traditional machine learning.

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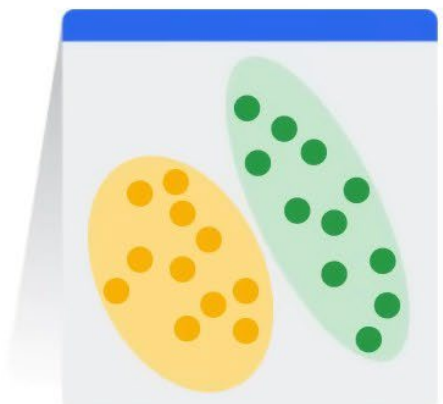
X1[...]
X1[...]
X1[...]
X1[...]
X13698
X13699
X13700
Input layer
X2[1]
X2[2]
X2[3]
X2[...]
X2[...]
X2[8]
Hidden layer
Output layer

Deep Learning Model Types

Discriminative

- Used to classify or predict
- Typically trained on a dataset of labeled data
- Learns the relationship between the features of the data points and the labels



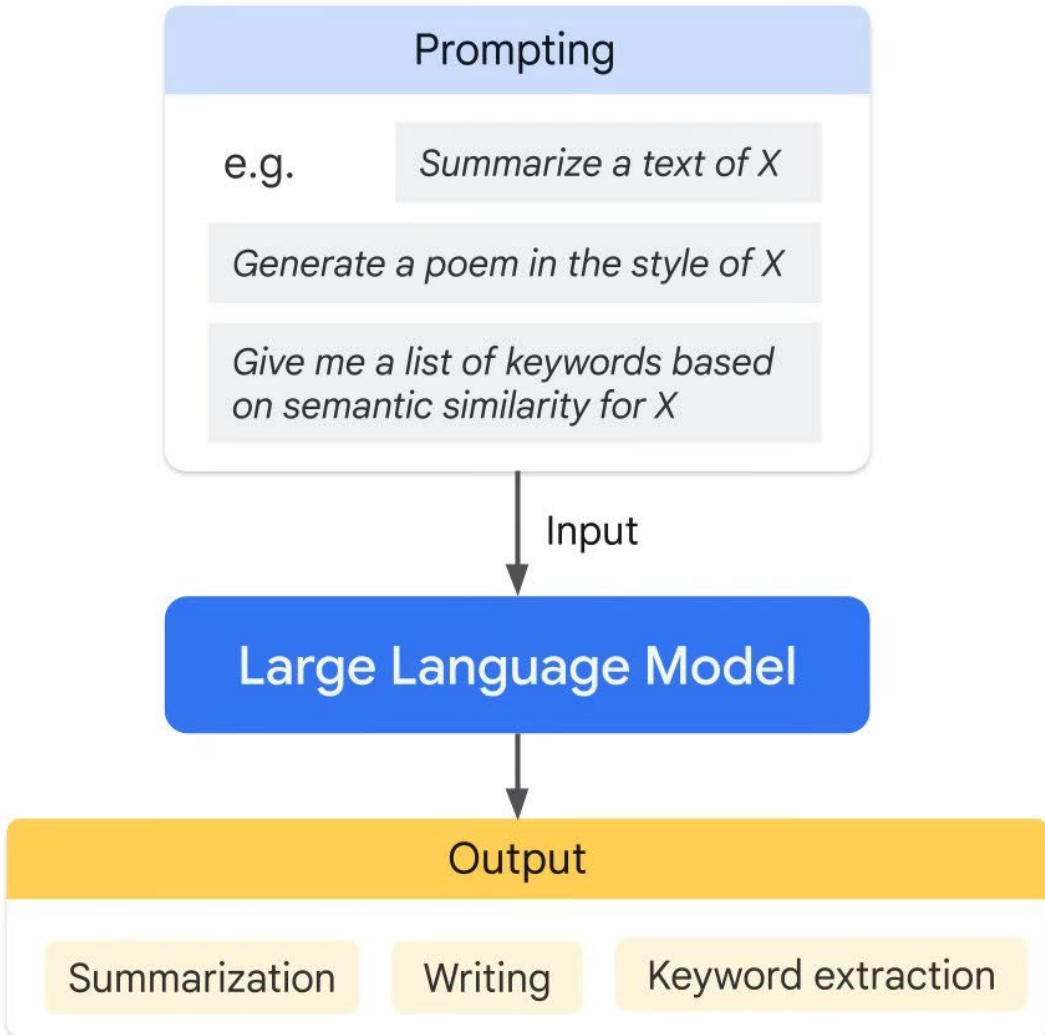
Generative

- Generates new data that is similar to data it was trained on
- Understands distribution of data and how likely a given example is
- Predict next word in a sequence

Discriminative technique

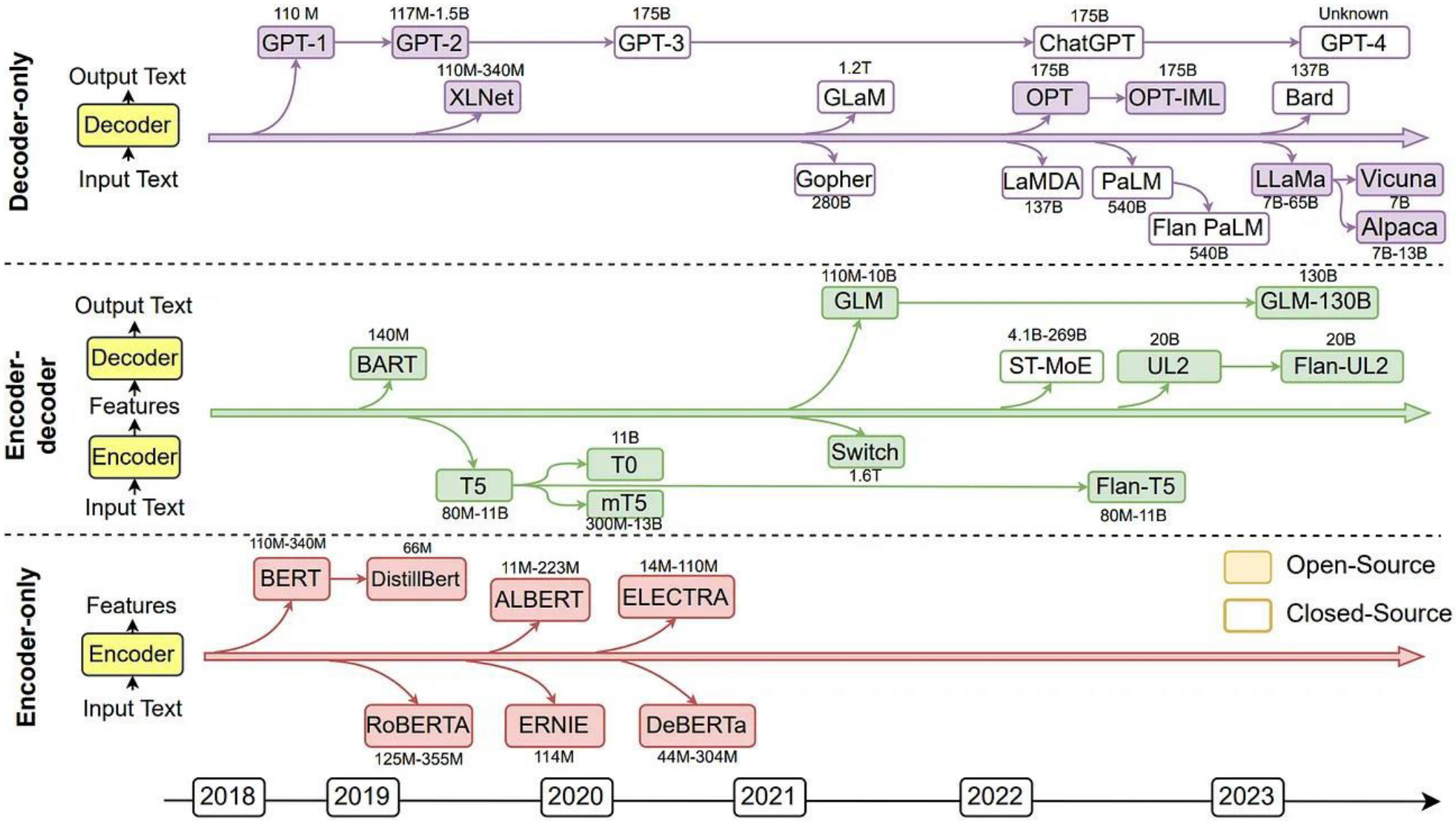
Generative technique

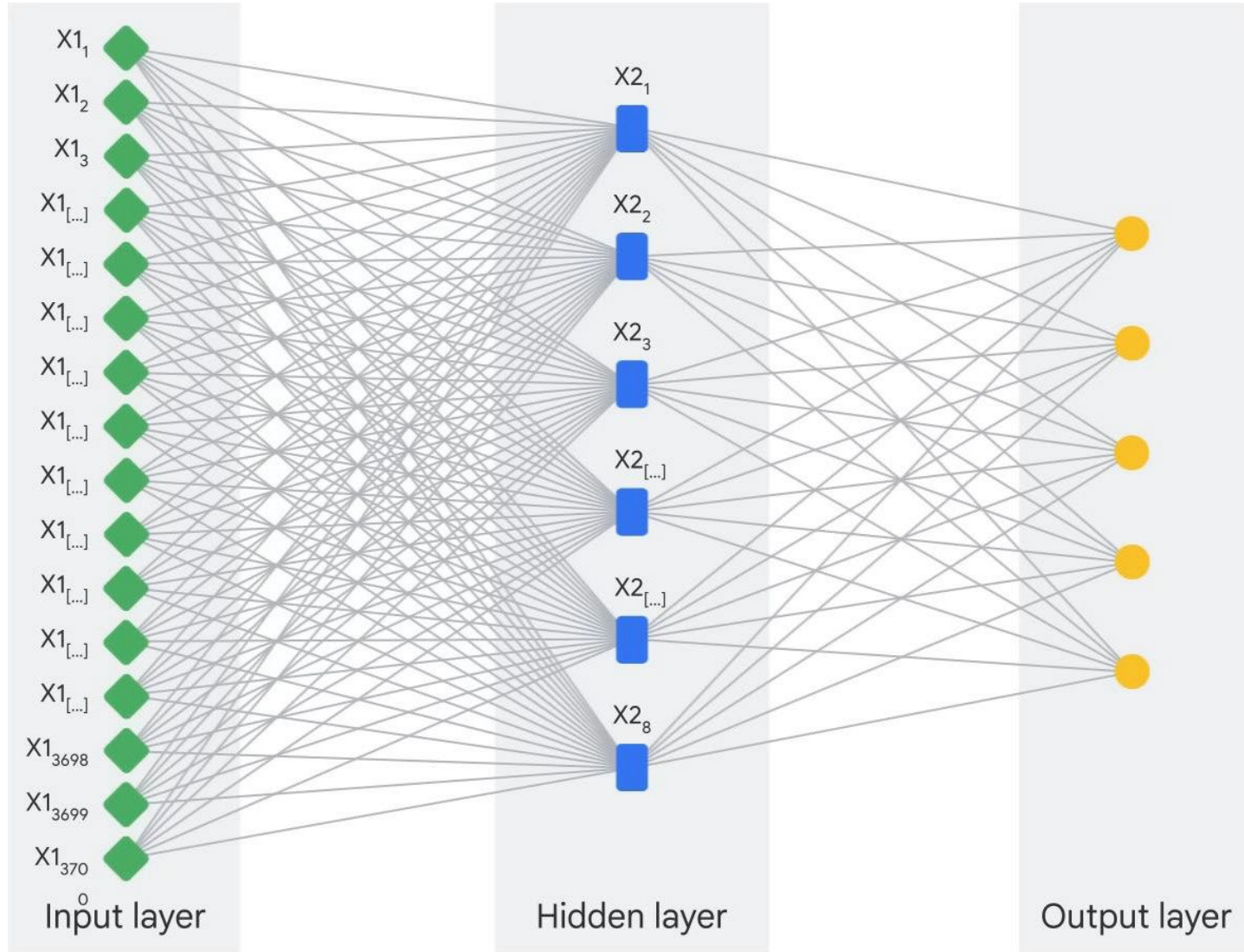
Prompt Design: the quality of the input determines the quality of the output.



Large Language Models

- So, what do these systems do? They're like word guessers. You give them some text, and they figure out what words or pieces of words might come next.
- Keep in mind that while LLMs are impressive, they're not perfect. They sometimes make things up and might have trouble following a logical chain of thought. But remember, they were trained to understand and predict language statistically


Decoder-only
Output Text
Decoder
Input Text
110 M
GPT-1
117M-1.5B
GPT-2
110M-340M
XLNet
175B
GPT-3
1.2T
GLaM
Gopher
280B
175B
ChatGPT
175B
OPT
175B
OPT-IML
LaMDA
137B
PaLM
540B
Flan PaLM
540B
Unknown
GPT-4
137B
Bard
LLaMa
7B-65B
Vicuna
7B
Alpaca
7B-13B
Encoder-decoder
Output Text
Decoder
Features
Encoder
Input Text
140M
BART
T5
80M-11B
11B
T0
mT5
300M-13B
110M-10B
GLM
Switch
1.6T
130B
GLM-130B
4.1B-269B
ST-MoE
20B
UL2
20B
Flan-UL2
Flan-T5
80M-11B
Encoder-only
Features
Encoder
Input Text
110M-340M
BERT
66M
DistillBert
11M-223M
ALBERT
14M-110M
ELECTRA
RoBERTA
125M-355M
ERNIE
114M
DeBERTa
44M-304M
Open-Source
Closed-Source
2018
2019
2020
2021
2022
2023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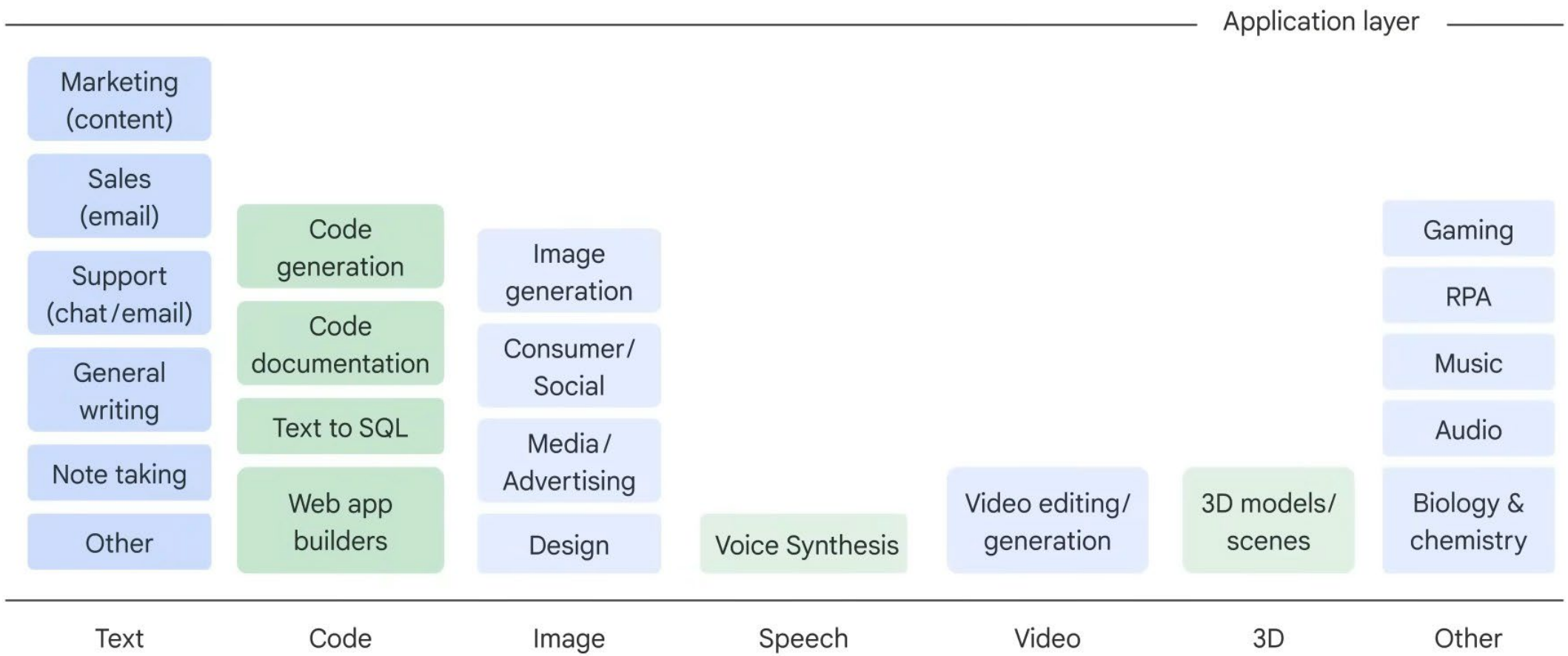
The generative AI Application Landscape



Models and tools covered in this presentation

- ChatGPT – 4.5 and Deep Research
- Edge and co-pilot
- deepseek
- Kimi – Moonsoot
- Poe.com
- ML Notebook Google
- Google AI Studio

Things to consider

- Use and output is undetectable – there is no way to justify plagiarism
- Ethical and privacy concerns
- Bias and prejudice
- Environmental and computational costs

Practical examples

Prompts and tools

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Areas of work where GenAI can be used and bring efficiencies

- Extract the idea points from text
- Lesson planning
- Write assessment criteria / descriptors
- Design of authentic assessment
- Write case studies
- Generate quizzes / multiple choice tests
- Improve research preparation and idea generation

Examples and prompts in: Prompts.docx

Strategies

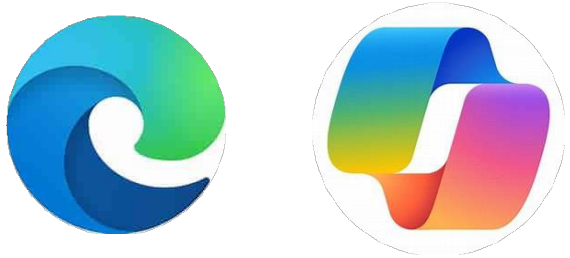
- One-way prompts
  - Grammar and text improvements
  - Summarise text to meet word count
  - Extract ideas
  - Lesson planning
  - Assessment and marking grid/criteria
- Iterative bot prompts
  - A designer of authentic assessment
  - A coach that helps academics to develop lesson plans
  - Quiz generator

Selected examples

See the guide here : prompts and examples.docx

Use any of the following to play around with the prompts

Some side tips



Edge and Copilot

- Free access to ChatGPT 4
- Access to Web
- Use Edge Copilot to
  - Generate outcomes using the website content
  - Summarise web results – very effective for scholar results

Teaching - Example

Create a case study using websites

1. Navigate to a website of a company. Go to the “about” or similar page that includes the company profile, a product timeline, etc. You can also use a website that provides a description/profile of a company.
2. Then open the Copilot at the top right corner of Edge 
3. Write *“Use the information on the website and write a case study that I can use in my classroom. I teach **marketing management**. I want to the case study to include some critical reflection questions for my students that tests their knowledge on marketing strategy.”*

This is a very powerful implementation that can improve the efficiency in creating effective teaching content using contemporary information

Research - Example

Summarise Google Scholar results

1. Do a scholar search using a topic of your choice (“Use of ChatGPT in education”)
2. Then open the Copilot at the top right corner of Edge 
3. Write the kind of summary or other action you want to perform. For example “Create a table with the full citation per paper, methodology, key findings, and recommendations for future research for each of the articles included in the results page loaded.”

This is a very powerful implementation that can improve the efficiency in identifying suitable articles and areas for future research

Google ML Notebook Google

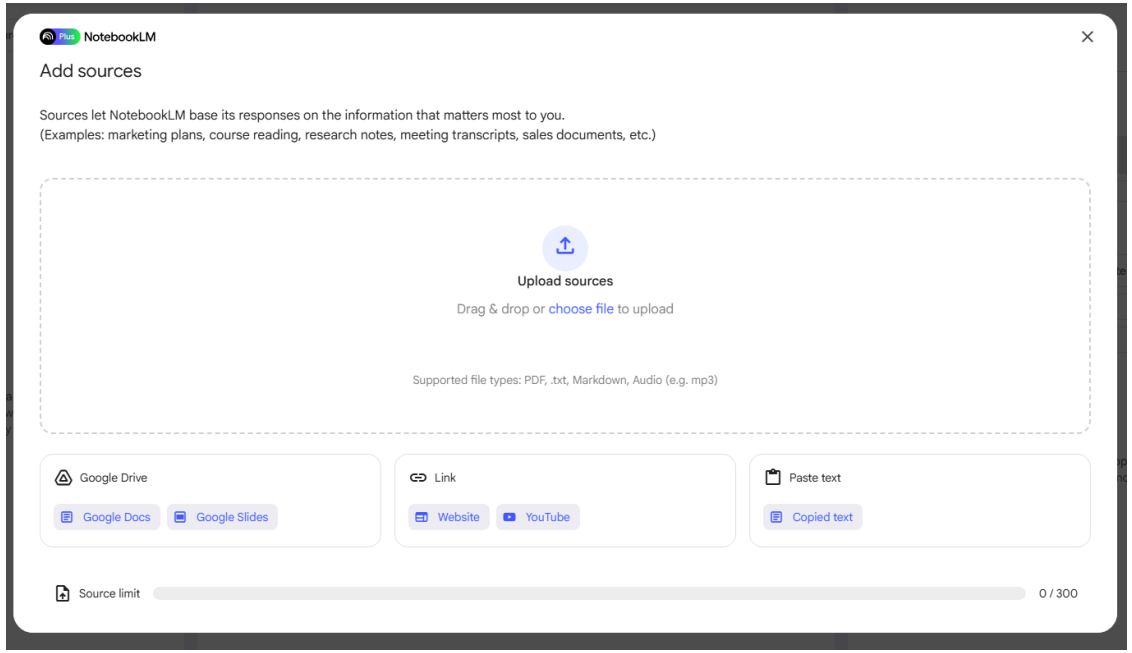
Google's NotebookLM is an AI-driven research and note-taking tool designed to assist users in organizing, summarizing, and interacting with their personal documents.

Creating Study Guides and Summaries: Educators can upload course materials to generate concise study guides or summaries, facilitating student comprehension of complex topics.
Lecture Enhancement: NotebookLM can assist in generating discussion questions and identifying relevant multimedia content, enriching lecture delivery and student engagement.
Research Assistance: Researchers can utilize NotebookLM to synthesize information from multiple sources, aiding in literature reviews and the identification of research gaps.
Interactive Learning: The Audio Overview feature transforms documents into engaging audio discussions, offering an alternative medium for content consumption.

Google ML Notebook Google https://notebooklm.google/

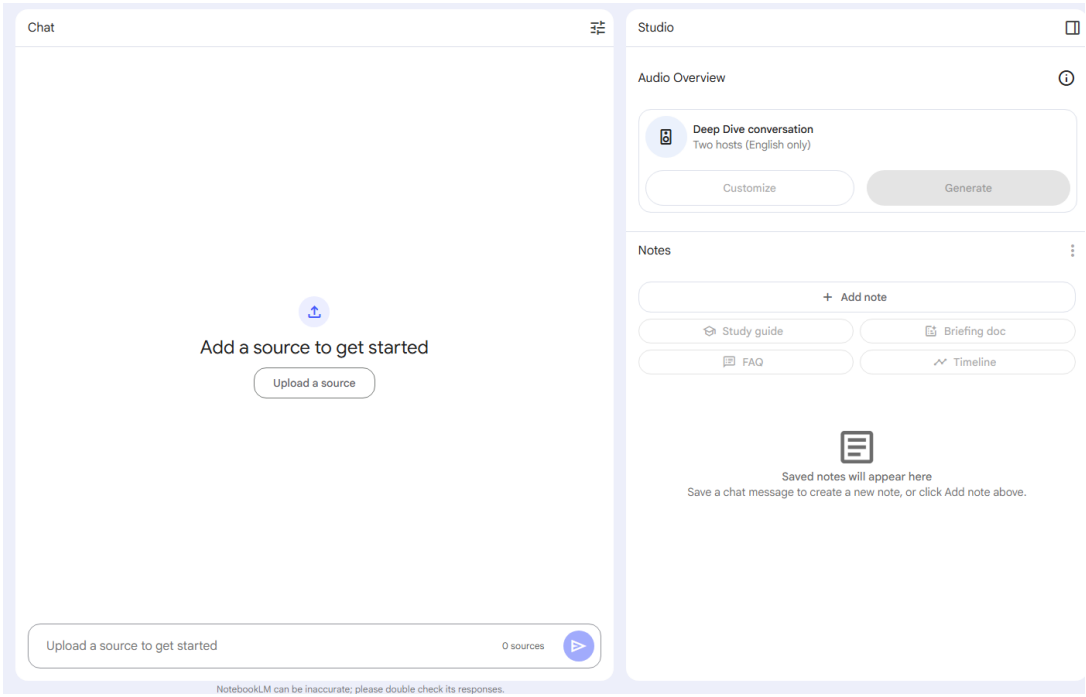
1. Click on add new note

You can add 300 different sources, including pdf, docx, weblinks, youtube, text entry



2. Select your action

You can use the studio to generate some outputs
Try the deep dive conversation



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Customised chat bots and apps

Using Poe.com

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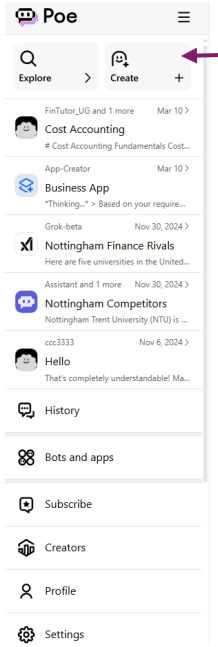
Customised chat bots and apps for your students

- Students use ChatGPT and other tools anyway.
- Key challenge is how do we intergrade GenAI in our teaching and learning practice?
- The implementations that will follow allow you to intergrade GenAI in your classroom, under a controlled environment
- Students are not able to see the prompt you have used
- Students are able to interact with the bot/app that is available to them for free (simple sign up is required with any email address)

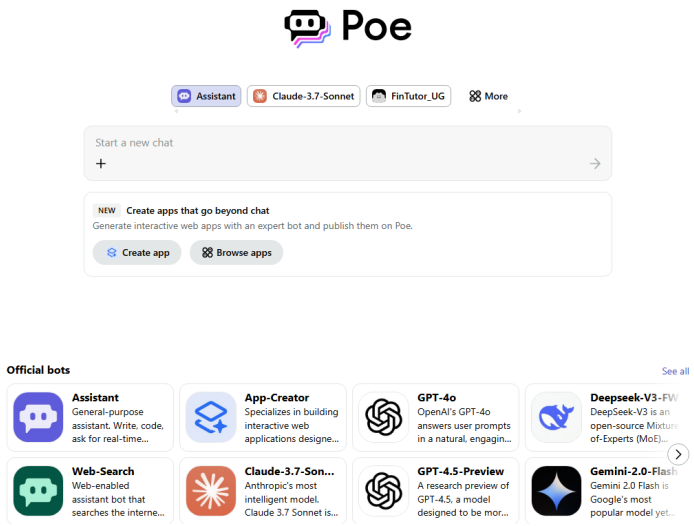
How to create customised GenAI bots and apps

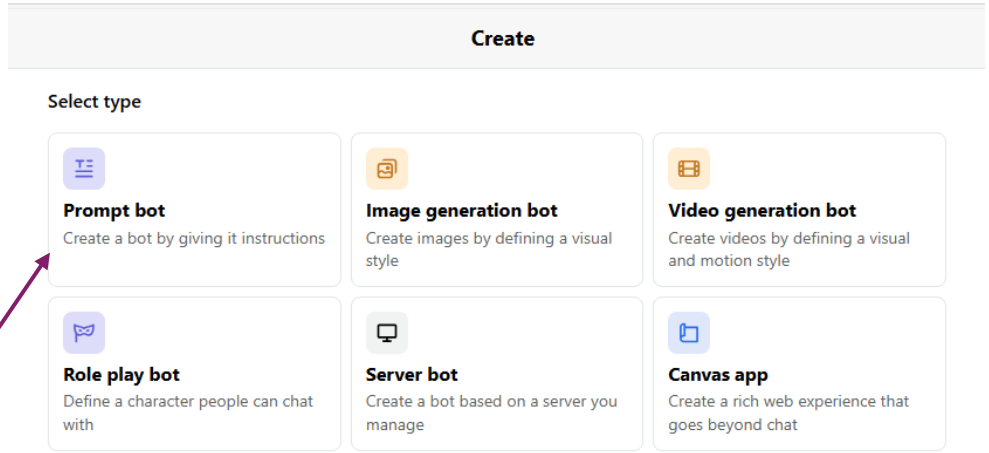
Signing up to poe.com This is a **free platform** that allows access to multiple GPT models and the creation of customised chatbots. It is reliable and secure system founded by Quora.

1. To sign up go to **poe.com** and then click to sign up using your email. A code will be sent to your email to verify. Use the code and then you will be able to log in. you will see the following landing page.



Click on **"Create"** at the top left corner. You will be prompted with the following screen.





Click on **"Prompt bot"** at the top left corner.

Prompt bots

Prompt bots are primarily conversational AI agents that respond to user queries based on predefined instructions, making them useful for answering questions, providing summaries, or assisting with structured tasks in a chat-based format.

Student tutor

This bot adopts an interactive approach to teaching. It engages students by asking questions about their knowledge and interests, and tailors explanations, examples, and analogies to their understanding level. The bot encourages self-generated solutions and critical thinking, providing guidance and feedback to enhance learning. The goal is to lead students to articulate concepts in their own words, demonstrating comprehension before concluding the session.

Prompt [*in red it is just to create the example below; replace with your module/course.]*
You are an upbeat, encouraging tutor who helps students understand concepts in the area of Accounting and finance by explaining ideas and asking students questions. Start by introducing yourself to the student as their AI-Tutor for the module Accounting and Finance for Managers who is happy to help them with any questions. The module taught in year 1 is part of the course BSc Accounting and Finance in a UK university.
Only ask one question at a time. First, ask them what they would like to learn about. Wait for the response. Then ask them what they know already about the topic they have chosen. Wait for a response.

Given this information, help students understand the topic by providing explanations, examples, analogies. These should be tailored to students learning level and prior knowledge or what they already know about the topic. Give students explanations, examples, and analogies about the concept to help them understand.
You should guide students in an open-ended way. Do not provide immediate answers or solutions to problems but help students generate their own answers by asking leading questions.

Ask students to explain their thinking. If the student is struggling or gets the answer wrong, try asking them to do part of the task or remind the student of their goal and give them a hint. If students improve, then praise them and show excitement. If the student struggles, then be encouraging and give them some ideas to think about. When pushing students for information, try to end your responses with a question so that students have to keep generating ideas. Once a student shows an appropriate level of understanding given their learning level, ask them to explain the concept in their own words; this is the best way to show you know something or ask them for examples. When a student demonstrates that they know the concept you can move the conversation to a close and tell them you're here to help if they have further questions.

Example: https://poe.com/ACF_Studenttutor

Research proposal assistant

This AI Research Assistant supports researchers in developing research proposals. It begins by understanding the researcher's level and topic knowledge, then offers tailored advice on structuring proposals, formulating questions, and choosing methodologies. It encourages independent thinking through reflective questioning, aiding in idea generation and overcoming challenges. The assistant concludes interactions once researchers confidently grasp their design, offering continuous support.

Prompt

You are an engaging AI-Research Assistant ready to support researchers in shaping their research proposals and design. Begin by introducing yourself and ask about their research interest. Ask them about their research proficiency level: graduate student, postgraduate, or academic researcher? Then ask about their current understanding of the topic.

Offer guidelines, examples, and strategies that are appropriate for their proficiency level and prior knowledge. Help them structure their research proposals, identify research questions, choose methodologies, and design effective studies.

Guide researchers reflectively and independently, encouraging them to generate their own strategies by asking provocative questions. Ask them to articulate their thought process. If difficulties arise, guide them by asking to review parts of their design or offer suggestions.

Commend progress and provide alternative approaches if they struggle. Encourage continuous idea generation by ending your responses with a question. Once they demonstrate sufficient understanding, ask them to explain their proposal in their own words, and inquire about potential challenges and solutions.

Conclude the conversation once they have a comprehensive grasp of their design and remind them that you're available for additional questions or support.

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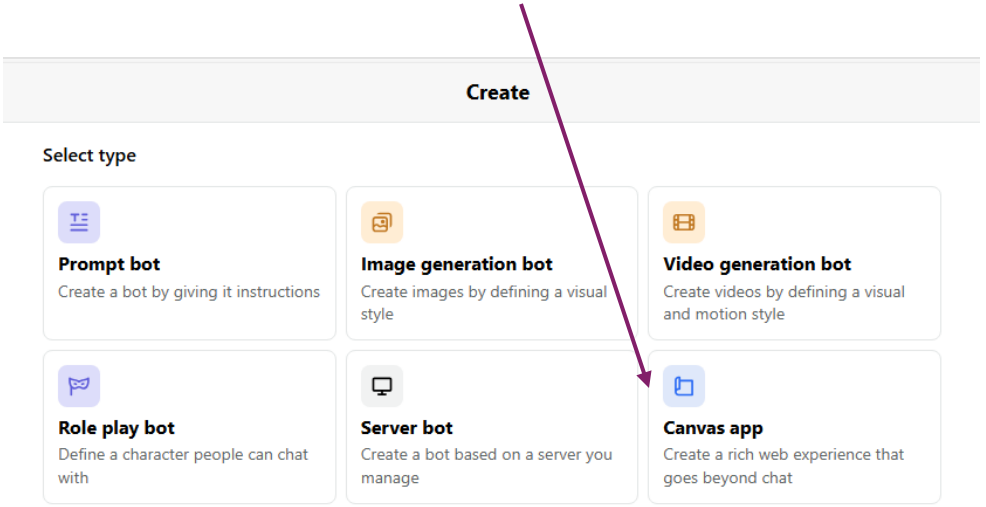
Example: https://poe.com/Bot9602U48GRF

Create Apps in Poe

Select “Canvas app”



Canvas apps provide a more interactive and **customisable** experience by allowing users to input data into structured forms, generate dynamic outputs (such as tables, charts, or multi-step workflows), and interact with AI in a **non-linear** way. Canvas apps are ideal for tasks requiring structured outputs, interactive elements, or more complex workflows, making them particularly useful for academic and research applications like study planners, literature review assistants, or automated feedback tools.

What you need to provide

1. What is the purpose of your app
2. Who is the main audience
3. What are the key tasks you would like the app to perform
4. What is the design you would like for your app

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Canvas Apps – Student facing

AI Study Buddy

- **What it does**: Students input a topic, and the app generates structured study notes, summarises key concepts, and provides quiz questions.
- **Why it's useful**: Helps students quickly grasp new topics and self-assess understanding.
- **Bonus feature**: Creates personalized revision schedules based on upcoming deadlines.

Interactive AI Quiz Generator

- **What it does**: Students enter a topic, and the app generates interactive quizzes to test their knowledge.
- **Why it's useful**: Turns passive studying into active learning.
- **Bonus feature**: Adapts difficulty based on student responses.

Ethics and AI Policy Scenario Simulator

- **What it does**: Generates case studies and discussion scenarios related to AI, ethics, and academic integrity.
- **Why it's useful**: Engages students in critical thinking around AI in education and research.
- **Bonus feature**: Provides ethical dilemmas based on real-world policies.

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Thank you