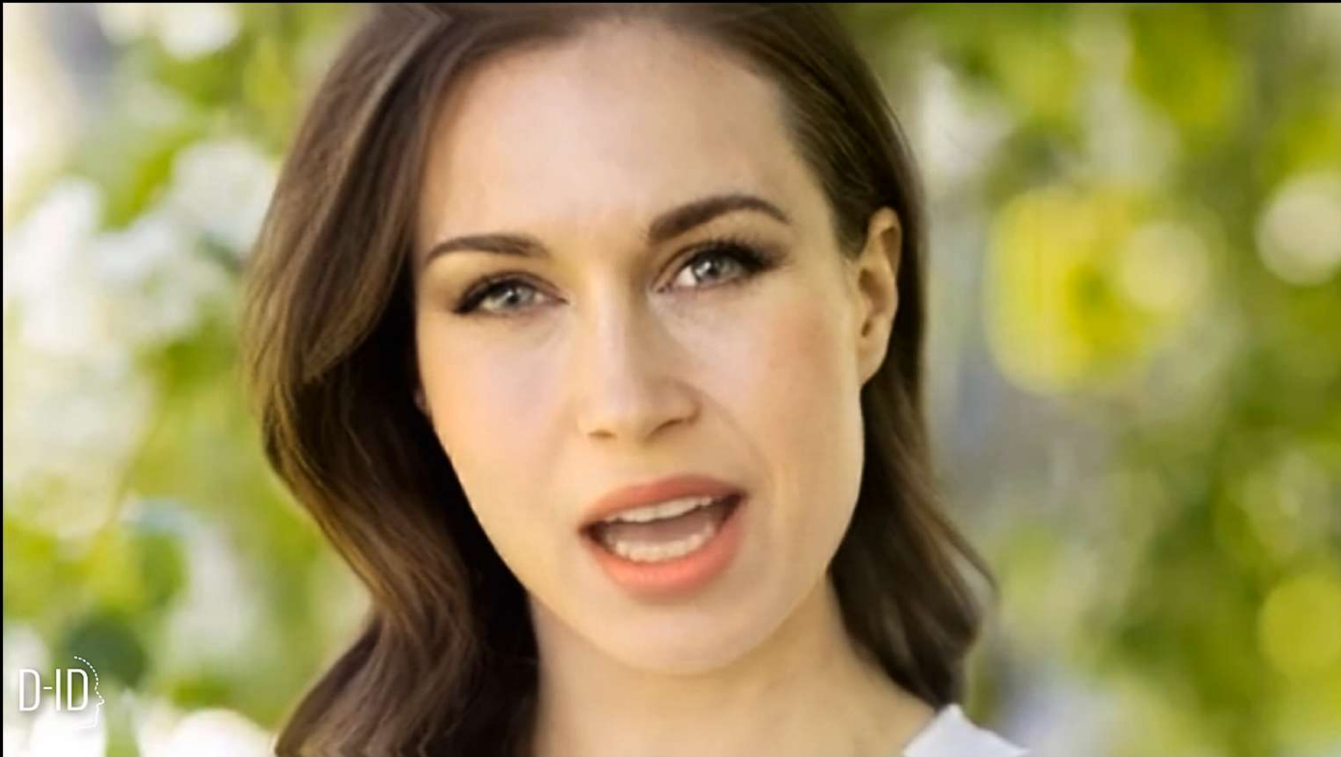


A futuristic robot head with glowing blue eyes and a neural network background. The robot is shown in profile, looking towards the right. The background is dark with glowing blue lines and nodes, resembling a neural network or data flow.

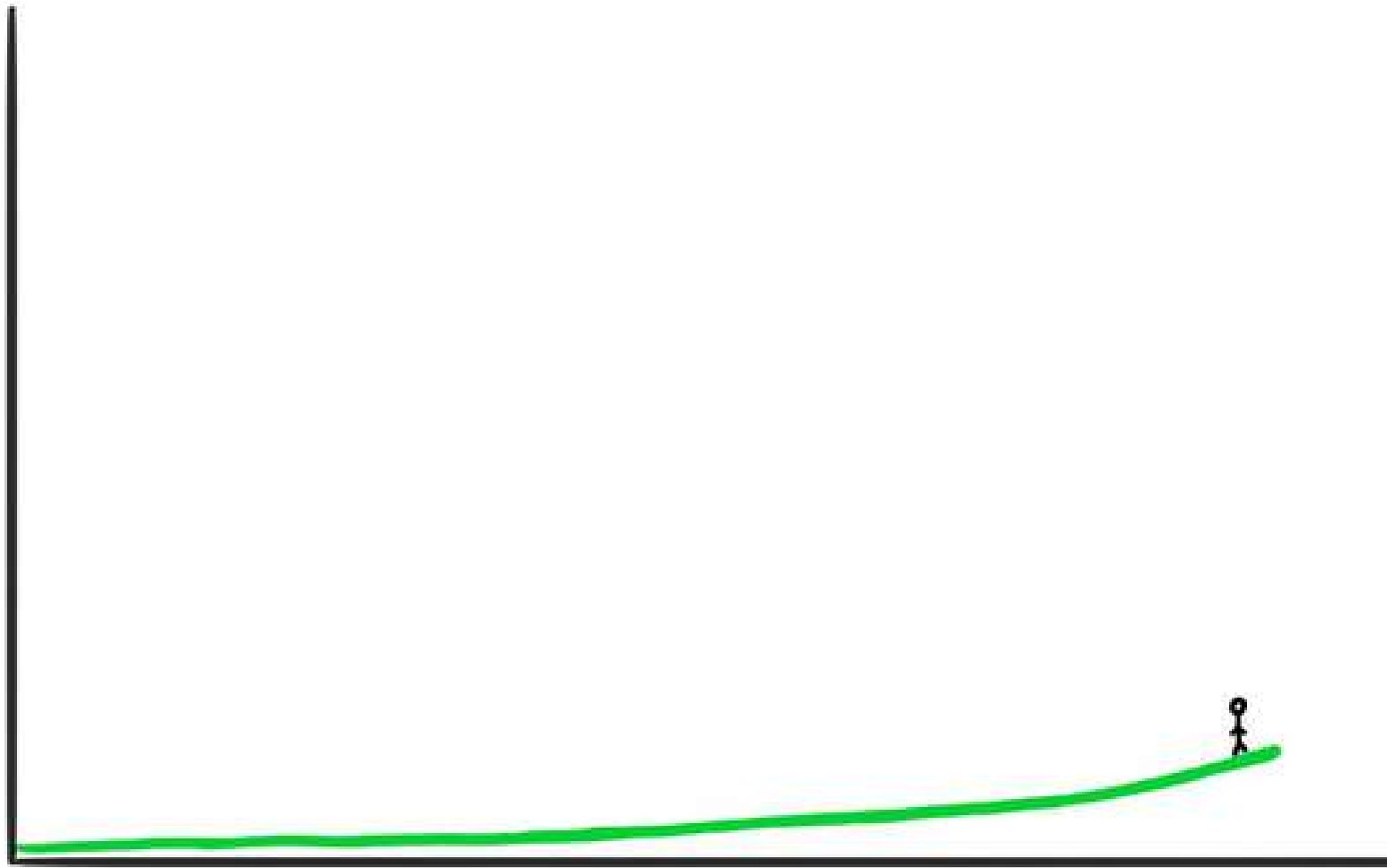
Kannattaako ChatGTP:tä käyttää ohjelmistojen kehittämiseen

Professori Pekka Abrahamsson
Tampereen yliopisto

4.4.2023

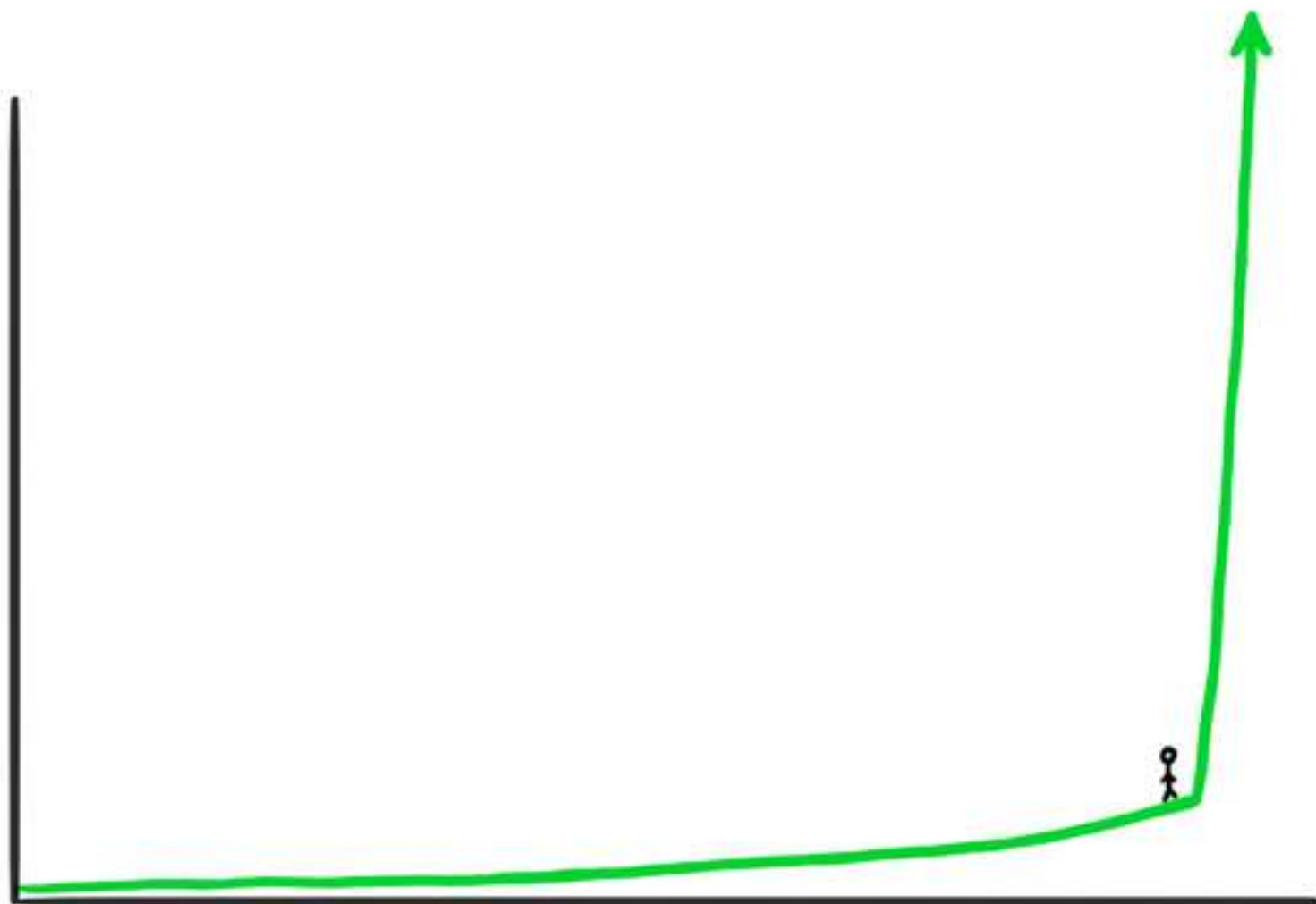


Human Progress



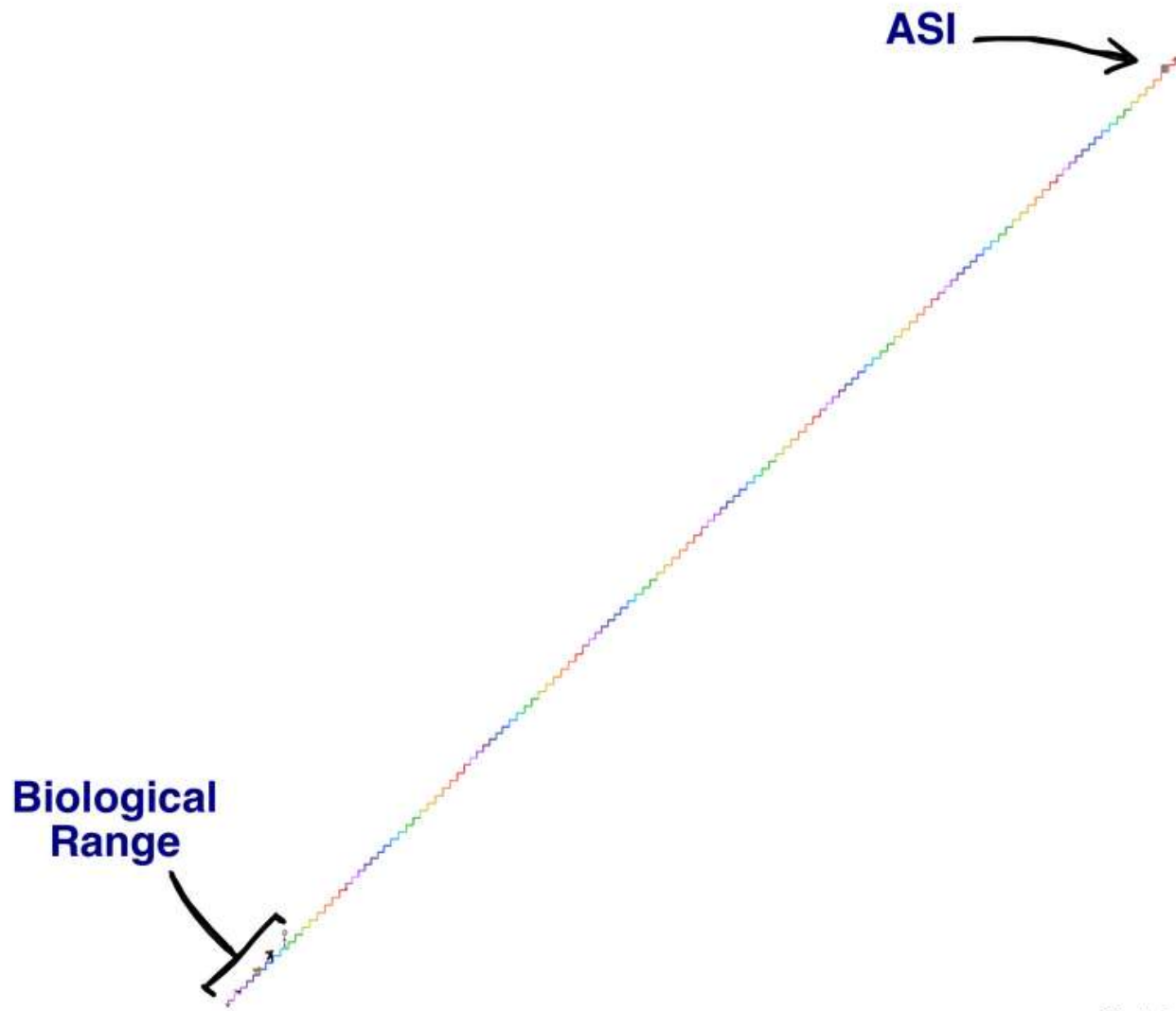
Time

Human Progress

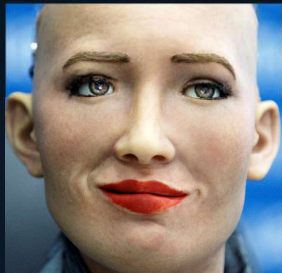


Time





HEY, WE ARE JUST GETTING STARTED

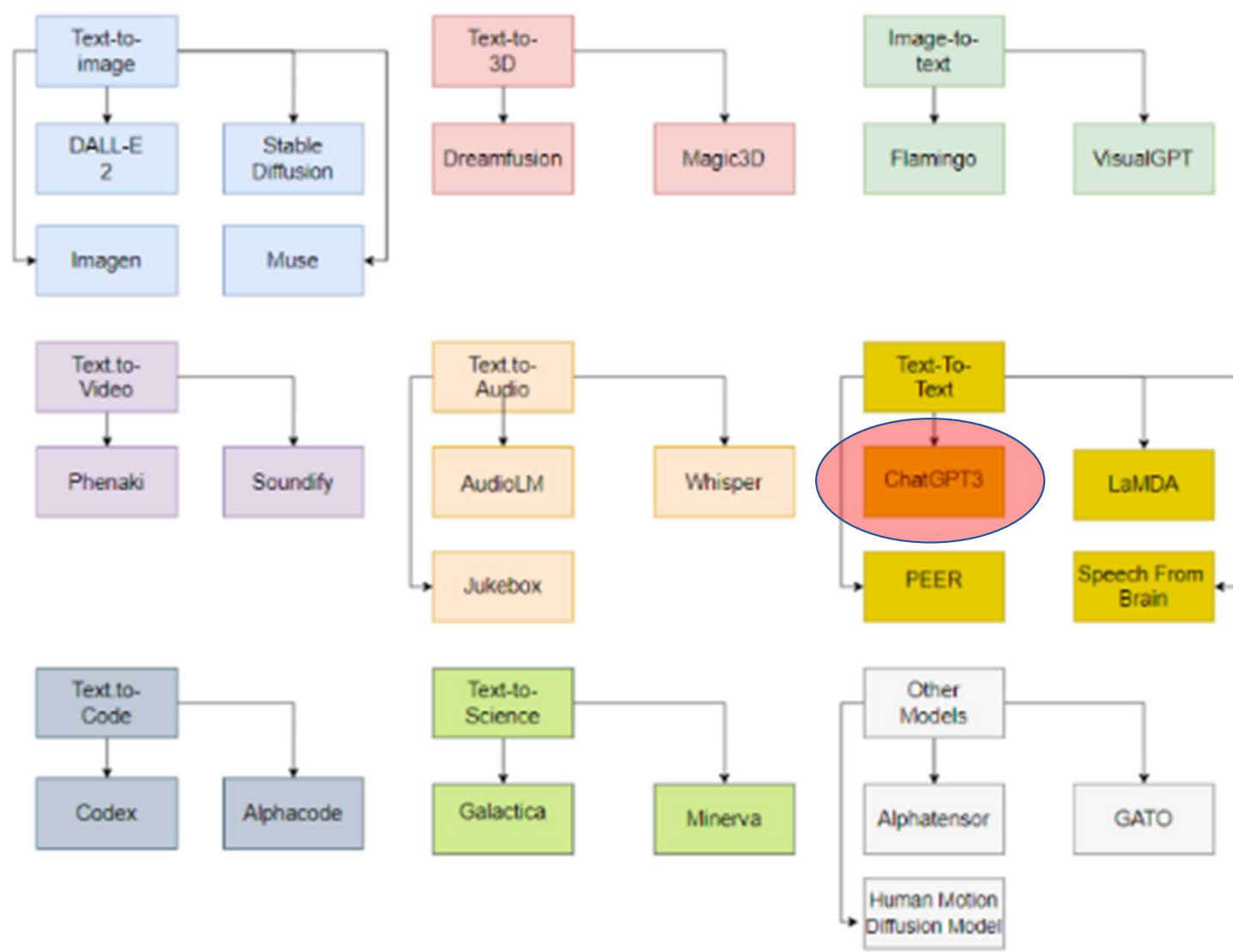


ECONOMIC
POLITICAL
SOCIETAL
ETHICS
TECHNOLOGY
SCIENCE



The background of the image consists of vertical stripes in various shades of purple and black, creating a textured, digital-like appearance.

ChatGPT



Maybe
ChatGPT (and
language
models) are
just a hype?



<https://futureoflife.org/open-letter/pause-giant-ai-experiments/>

- Therefore, **we call on all AI labs to immediately pause for at least 6 months the training of AI systems more powerful than GPT-4.** This pause should be public and verifiable, and include all key actors. If such a pause cannot be enacted quickly, governments should step in and institute a moratorium.

[← All Open Letters](#)

Pause Giant AI Experiments: An Open Letter

We call on all AI labs to immediately pause for at least 6 months the training of AI systems more powerful than GPT-4.

Signatures

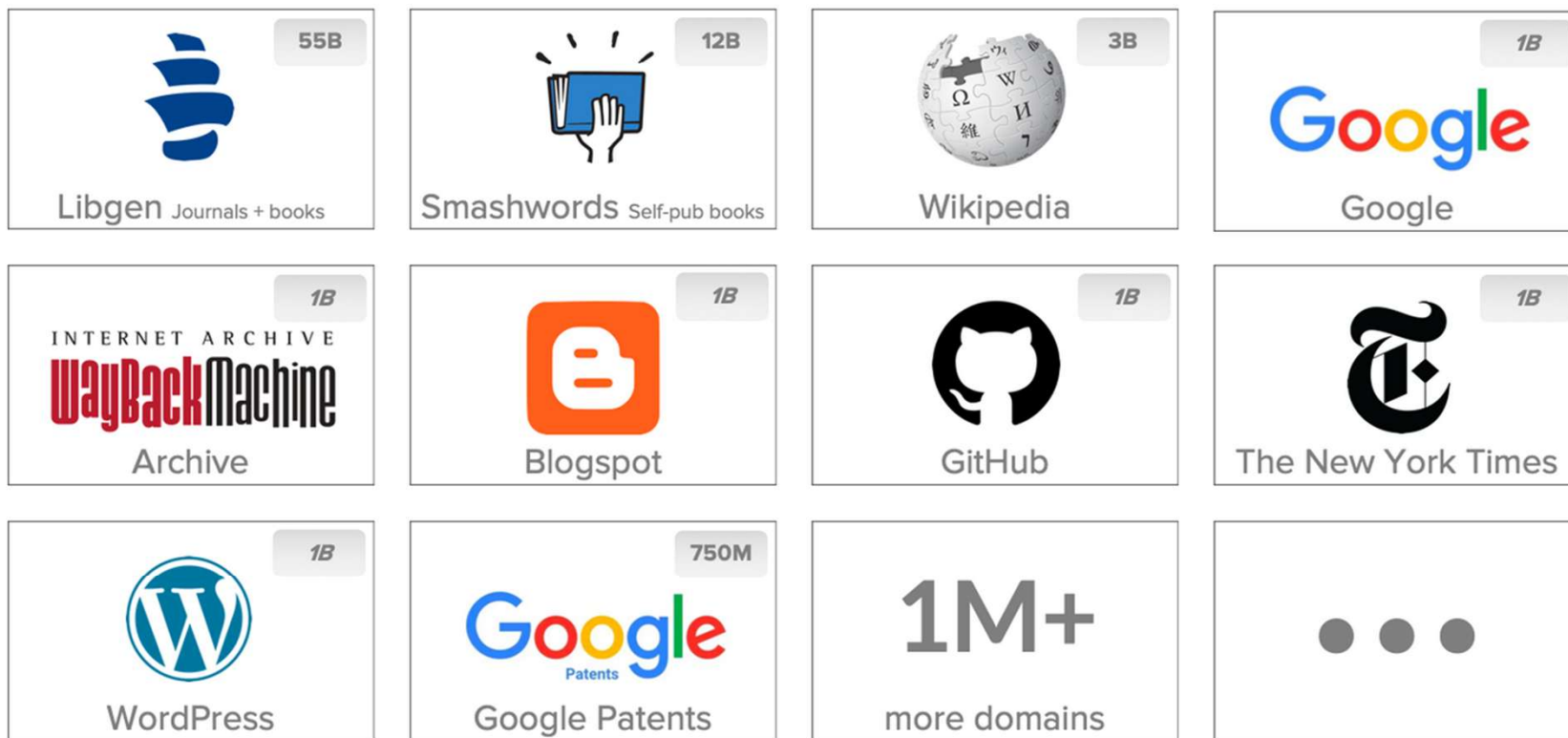
1377

Add your
signature

ChatGPT factsheet

- A chatbot, developed by OpenAI company, based in the US, operations funded by Microsoft by a significant degree
- Built on top of the Large Language Models (LLMs), GPT-3.5, GPT-4
- 100 million+ users, 25M daily
- GPT-3.5 has 170 Billion parameters, GPT-4 has something between 400-1000B (not confirmed)
- It is now estimated to produce a volume of text every 14 days that is equivalent to all the printed works of humanity.
 - -Source: Dr Thompson, Feb/2023, cited in report by the National Bureau of Economic Research (Scholes, Bernanke, MIT)

GPT-3'S TOP 10 DATASETS (BY DOMAIN/SOURCE)



Informed 'best guess' only.
 Sources: <https://lilearnitect.ai/papers/>
 Alan D. Thompson, Rev 3: February 2022.
<https://lilearnitect.ai/>

Tokens/words (known) **xB**

Tokens/words (estimate only) **xB**

GPT-4 promiseware

- GPT-4 accepts both image and text inputs (note! output is in text only today)
- Some Demo'ed Applications:
 - GPT-4 can convert your hand-drawn website mockups into actual website code.
 - See your refrigerator contents and tell you recipes you can make.
 - Read the tax code and calculate your taxes while citing sources.
- GPT-4 outperforms ChatGPT (GPT 3.5) on most academic and professional exams taken by humans like SAT, GRE, Bar Exams, etc.
- GPT-4 scored in the 90th percentile on the Uniform Bar Exam compared to GPT-3.5, which scored in the 10th percentile.
- GPT-4 is 82% better than ChatGPT/GPT 3.5 at detecting inappropriate requests and has better guardrails.
- ChatGPT plugins will be a game-changer for GPT allowing it to talk to external apps like Zapier, Wolfram, Code interpreters, etc. Open AI may have ushered in a new era of AI app stores.

PE what's a 5 letter word that is opposite of start



The 5 letter word that is the opposite of "start" is "stop."



stop has 4 letters



I apologize for the mistake. The 5 letter word that is opposite of "start" is "finish."



finish has 6 letters



I apologize for my mistake again. The correct 5 letter word that is opposite of "start" is "end."



end has three letters



I'm sorry for my mistake. The correct 5-letter word that is opposite of "start" is "halt."



halt has 4 letters



15 ways to benefit from ChatGPT

Natural Language Understanding

Multilingual Conversations

Knowledge Base

Creative Writing

Problem Solving

Simulating Conversations

Personalized Recommendations

Summarization and Simplification

Debates and Perspectives

Code and Technical Help

Role-playing and Gaming

Learning and Education

Emotional Support

Language Translation

Grammar and Writing Assistance

How ChatGPT is argued to help software engineers?

- 1. Providing answers to technical questions:** Software engineers often encounter complex technical problems that require research and analysis. ChatGPT can provide quick and accurate answers to these questions, drawing on a vast repository of knowledge.
- 2. Generating code snippets:** ChatGPT can also generate code snippets for specific tasks, which can save software engineers time and effort. This can be particularly useful for common tasks or for code that follows a specific pattern.
- 3. Assisting with debugging:** ChatGPT can help software engineers identify and troubleshoot issues in their code by analyzing error messages and providing suggestions for fixes.
- 4. Offering insights on emerging technologies:** ChatGPT can keep software engineers up-to-date with the latest trends and advancements in their field, such as new programming languages, frameworks, or tools.
- 5. Supporting collaboration:** ChatGPT can help facilitate collaboration among software engineers by providing a platform for real-time communication and sharing of ideas and resources.

Known issues / challenges

- There are several problems with the use of ChatGPT, Copilot and others, which need to be solved before wider adoption:
 - Code ownership, IPR issues
 - Limited applicability scope (limited due to training data)
 - False instructions, advice, information
 - Code defects
 - Known and unknown security threats
 - Security and privacy concerns
 - Working in a client development environment
 - Difficulty in integrating with an existing workflow and tools
 - Costs of large language models can be very high

ChatGPT's own advice with IPR issues

However, these remarkable capabilities raise concerns about IPR. As ChatGPT can generate code similar to existing copyrighted works, ensuring the proper attribution and licensing of the generated code is crucial. To address this, organizations can implement strict guidelines for using ChatGPT, such as:

1. Limiting its use to **internal projects**, avoiding potential copyright infringement in commercial applications.
2. Using generated code as a starting point, and encouraging engineers **to modify and adapt it**, thus creating distinct works.
3. Developing **in-house tools to** detect similarities between generated code and existing copyrighted works, minimizing the risk of infringement.

Common Use Cases



Use Case 1

AI-Assisted learning /
Project onboarding /
Training / Personal
assistant



Use Case 2

AI-Assisted Software
Engineering /
Development



Use Case 3

AI-Assisted Decision
Making based on your
own data

What do the scholars say now?

- ~1000 papers on Large Language Models in Arxiv (as of March-28th)
 - 52 papers on LLMs and software engineering
 - General themes covered: Program Synthesis, AI Evaluation, Bug Detection, Error Handling, Learning Materials Generation, Code Analysis, Code Completion Systems, Reverse Engineering, Spreadsheet Models and Code Poisoning
- 170 articles on ChatGPT or employed ChatGPT in Arxiv
- 90 articles with ChatGPT on title
- Only three studies related to Software Engineering
 - ChatGPT and Software Testing Education: Promises & Perils (experiment)
 - Towards Human-Bot Collaborative Software Architecting with ChatGPT (case study)
 - ChatGPT Prompt Patterns for Improving Code Quality, Refactoring, Requirements Elicitation, and Software Design (experience-based)

Some empirical findings

- ChatGPT was able to respond correctly to 56% of Software Testing exam questions, Jalil et al, 2023
- ChatGPT narrowly passed a computer science exam (24/40, student average 24), Bordt and von Luxburg, 2023
- ChatGPT resembles closely human patterns in language use, Cai et al, 2023 (10/12 experiments passed)
- ChatGPT's ranking preferences are quite consistent with human, Ji et al, 2023 (can be used to categorize data, zero-shot ranking capability good)
- ChatGPT beats Grammarly in fixing grammatical errors, Wu et al, 2023
- ChatGPT's zero-shot Text-to-SQL capabilities are impressively good, Liu et al., 2023
- ChatGPT is an excellent Keyphrase generator, Song et al, 2023
- ChatGPT lacks moral authority and is not consistent in its advice, Krügel et al, 2023
- ChatGPT is already at commercial product level in language translation, Jiao et al, 2023
- ChatGPT is 20x less costly than M-Turk for text annotation tasks and more accurate, Gilardi et al., 2023

Key messages

- Despite of advances, software engineering continues to be in crisis
- Adoption of AI-assisted tools is still in its infancy
- Introduction of LLMs may be a game changer in the field of SE but also in other fields as well.
- ChatGPT offered the missing user interface for the use of AI in various contexts. While scientific studies are still coming, early results indicate positive influences across many sectors.
 - It may hot air as well
 - Assistant that delivers 50% false results and provides a different answer to every question, would get fired in real life
 - Ethics issues are real, training material is biased
- Yet I believe that we should explore the new AI tools such as ChatGPT will **full force**
- The question remains, **how ChatGPT will help you research?**



A portrait of Pekka Abrahamsson, a man with long, wavy, light-colored hair and a beard, wearing a blue suit jacket over a light blue shirt. He is looking slightly to the right of the camera with a neutral expression. The background is a blurred outdoor setting with a building and trees.

Reach me at
pekka.abrahamsson@tuni.fi

**IT IS ONE THING TO BE
THE FIRST. IF YOU ARE
NOT, YOU JUST NEED TO
BE BETTER THAN ALL
THOSE BEFORE YOU.**

PEKKA ABRAHAMSSON