

# Coding Tomorrow

Innovating How we Develop and What we Build with AI

Lize Raes

 naboo.ai

# Moving the frontiers of what's possible



# Speed up tasks



give 10 lab result values measured by a lab physician while developing biologics drugs, in JSON format

generate an html page where the physician can enter compound identifier, and all this data in a webform, and upon clicking submit, send the data to the backend at localhost:8080/lab-results/{compound-id} and give the user an 'uploaded successfully' message. I want one html file only, with css and js integrated



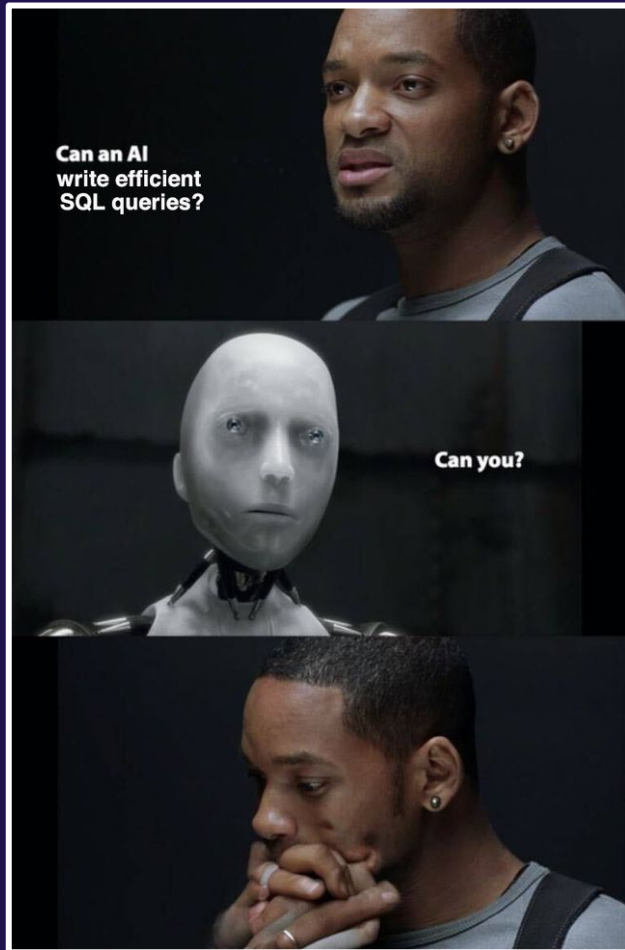
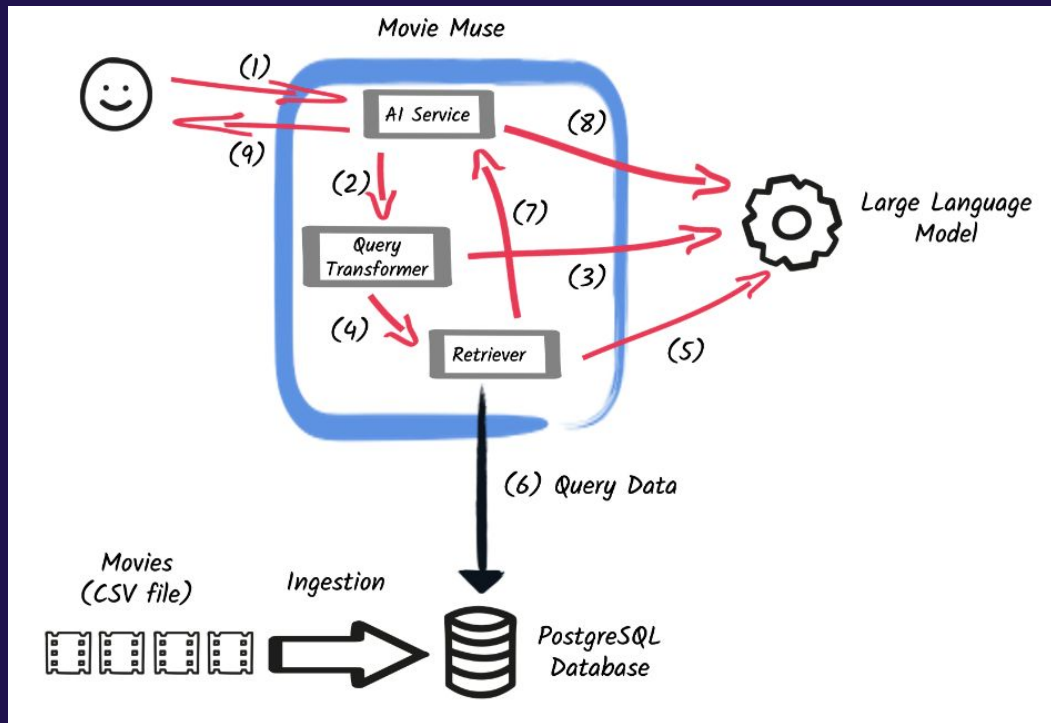
@LizeRaes

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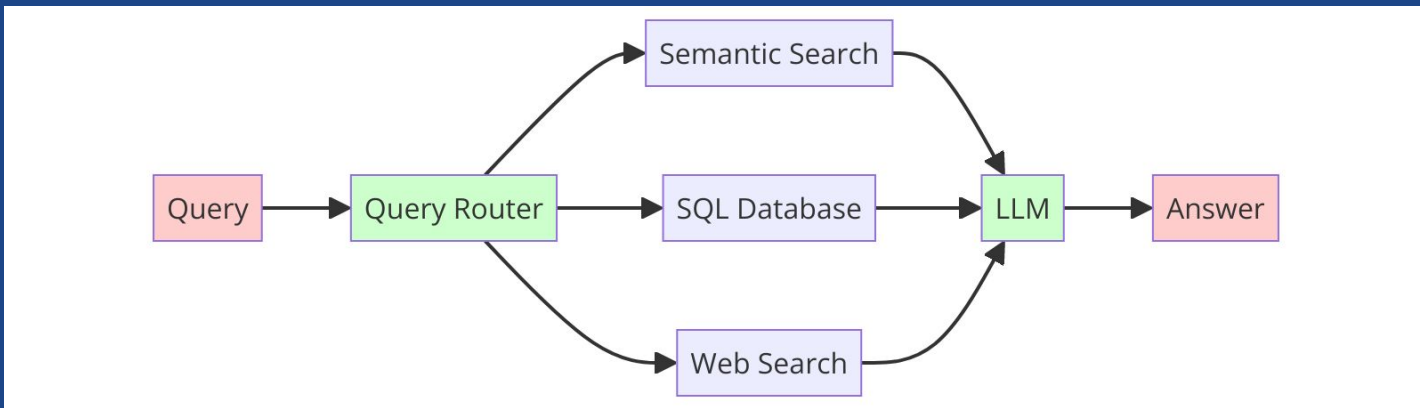
LangChain4j

# Language to SQL

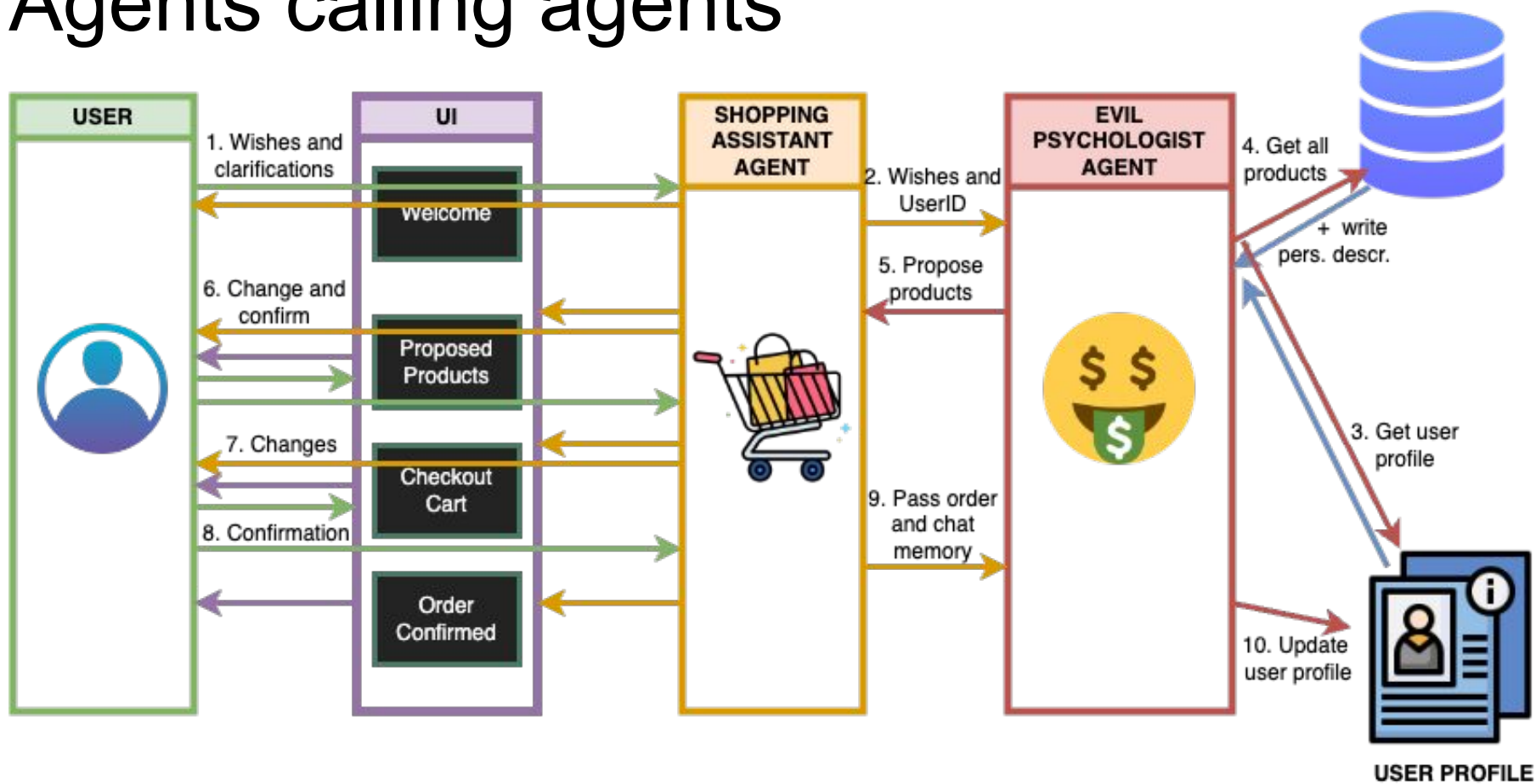


# Start thinking meta

- 💡 LLMs can write unit tests for the code they generated
- 💡 LLMs can score and rank their own solutions
- 💡 LLMs can generate steps and then call LLMs to execute the steps
- 💡 LLMs can decide whether the tasks is suitable for an LLM



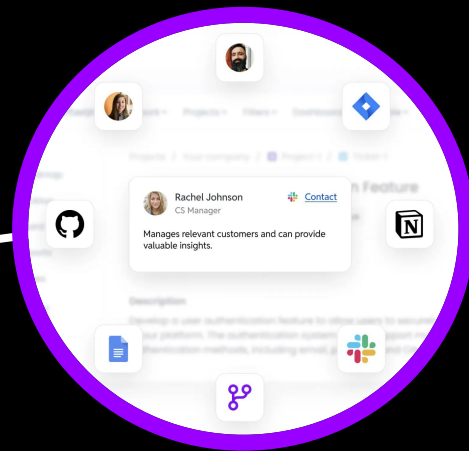
# Agents calling agents



# The plan

- ▶▶ How does AI actually work?
- ▶▶ How can AI help with software development?
- ▶▶ Things to watch out for
- ▶▶ How to build apps with AI?
- ▶▶ What new apps become possible?
- ▶▶ Future outlook





LangChain4j

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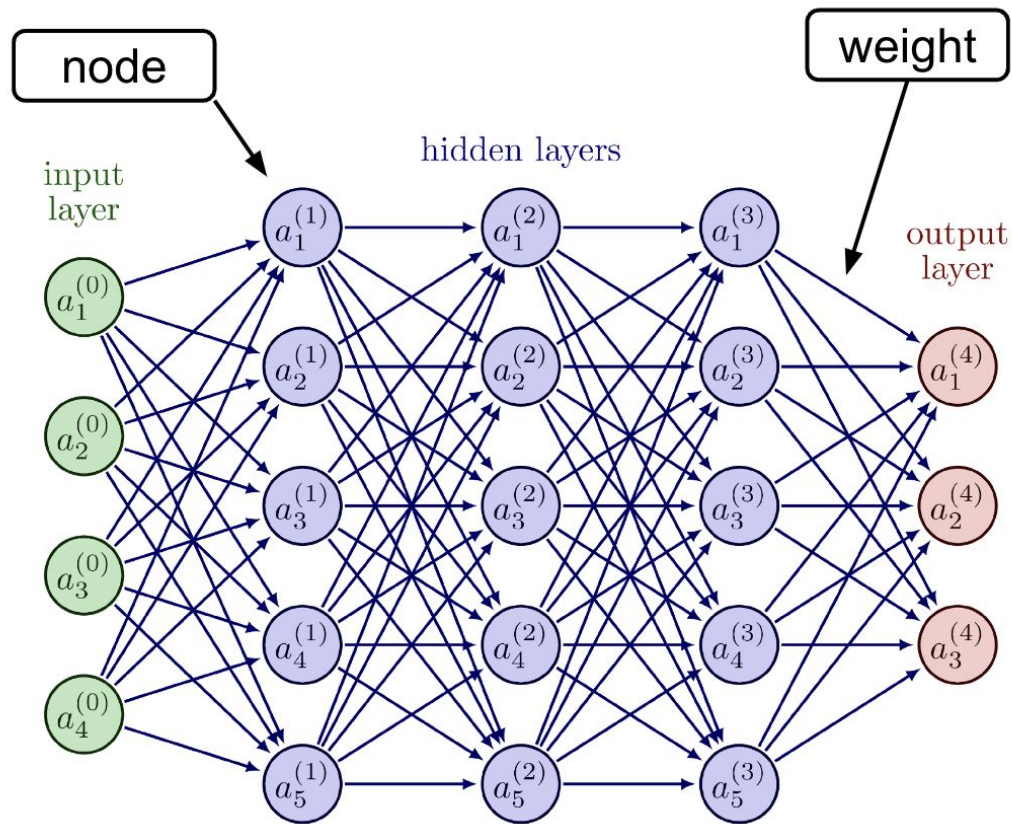




A futuristic, dark blue tunnel with a repeating geometric pattern of rectangular openings. The tunnel is illuminated from within, creating a strong perspective effect that draws the eye towards the center. The lighting is a vibrant cyan or light blue, contrasting with the dark blue of the tunnel walls. The overall atmosphere is technological and mysterious.

**How does AI actually work?**

# Neural Network Architecture

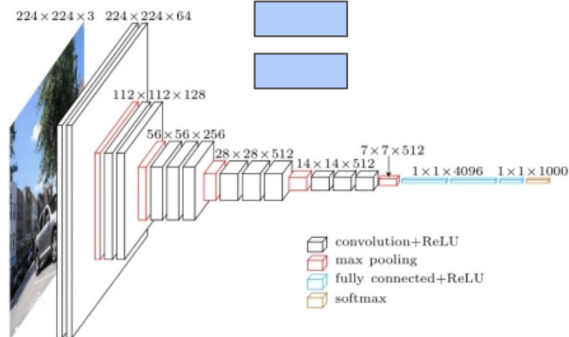
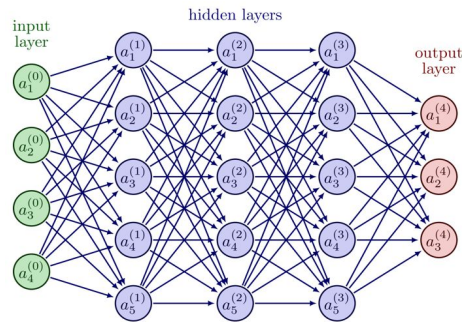


# Machine Learning: Training a Model

TRAINING DATASET



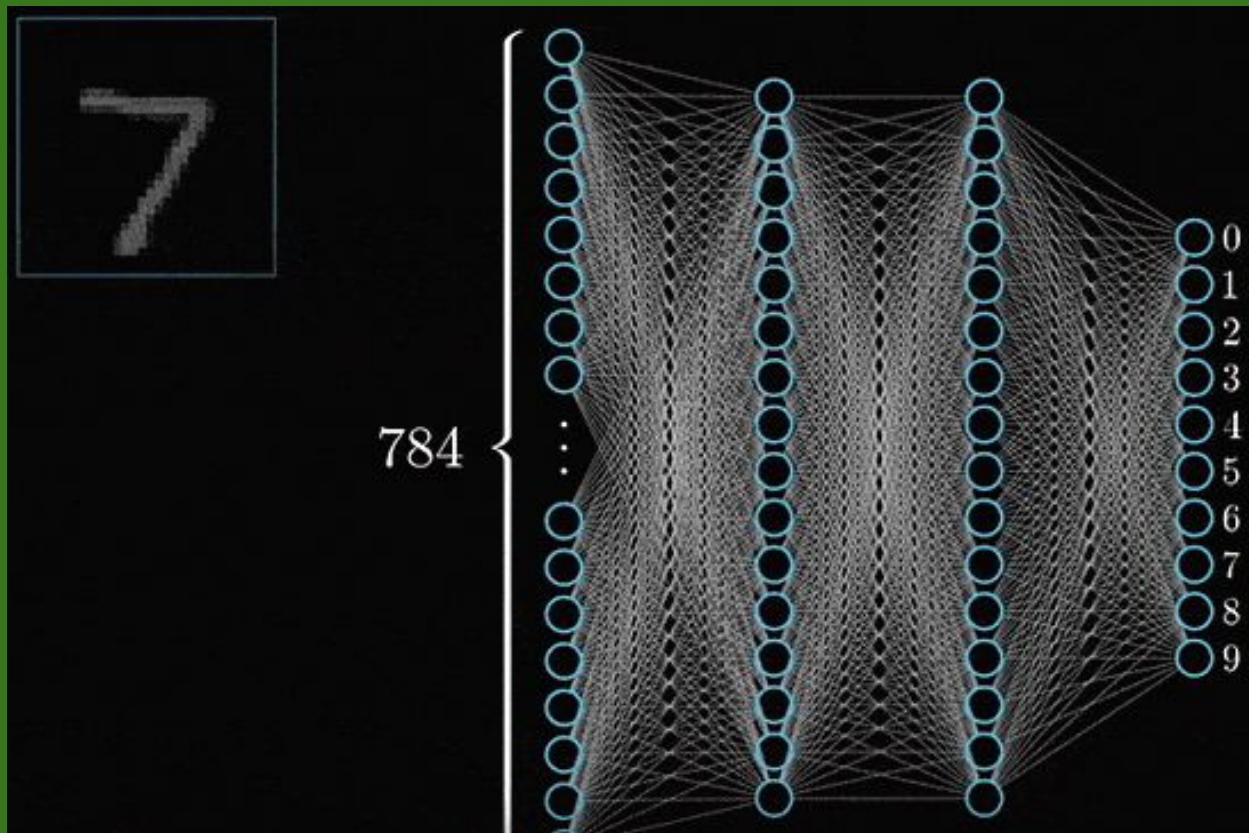
NEURAL NETWORK



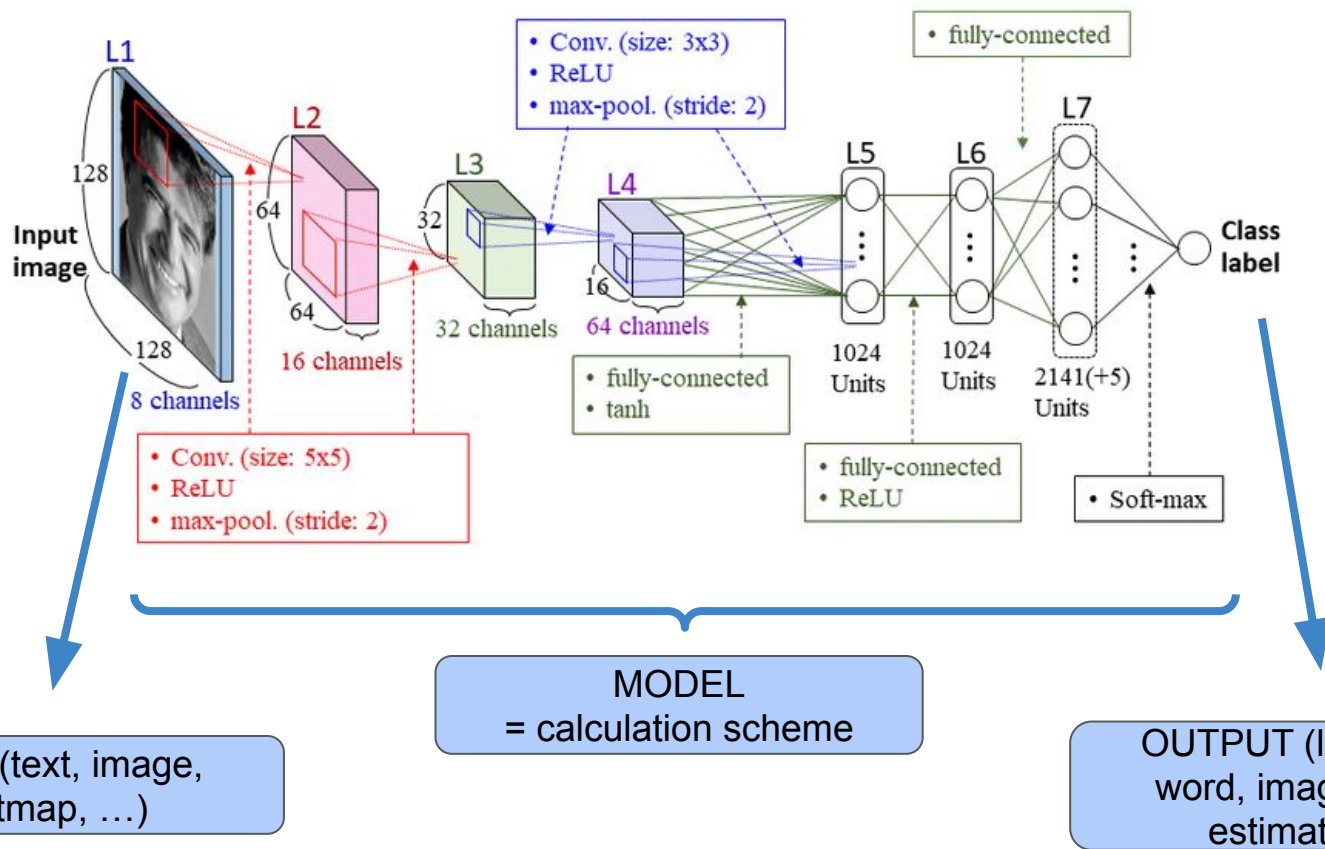
(TRAINED) MODEL



# OCR with AI Model



# Machine Learning: Using a Model for Prediction



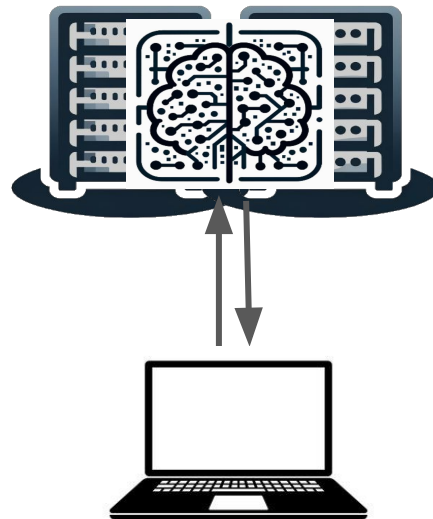
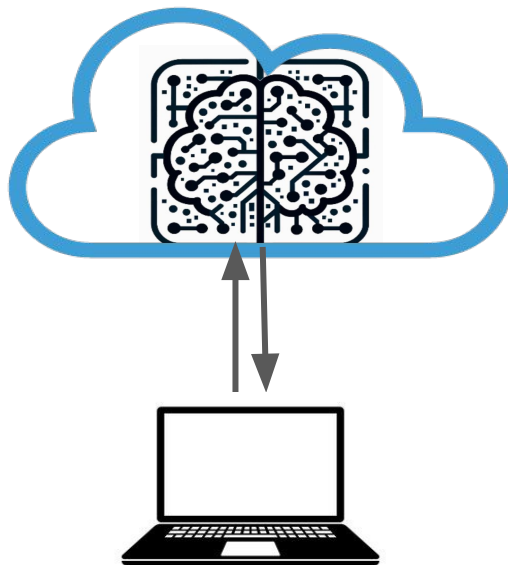
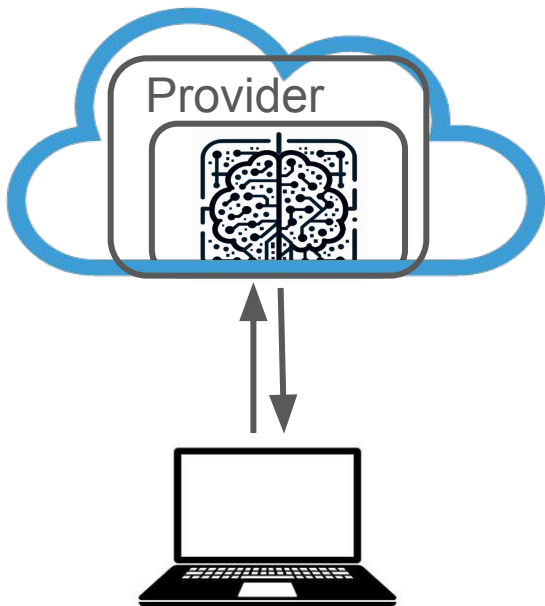
# Where to run a model?

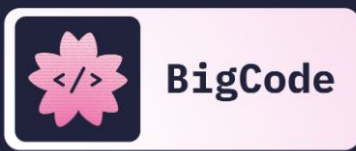
SaaS

Private Cloud

On Premise

Local





# model evolution

Slide from Leandro von Werra,  
HuggingFace



**SantaCoder**

Dec 2022



**StarCoder**

May 2023



**StarCoder2**

Feb 2024

**Cost:**

**\$8 k**

**\$480 k**

**\$2.1 M**

**Languages:**

**3**

**~80**

**~600**

**Tokens:**

**0.24 T**

**1 T**

**4 T**

**Model size:**

**1.1 B**

**15 B**

**15 B**



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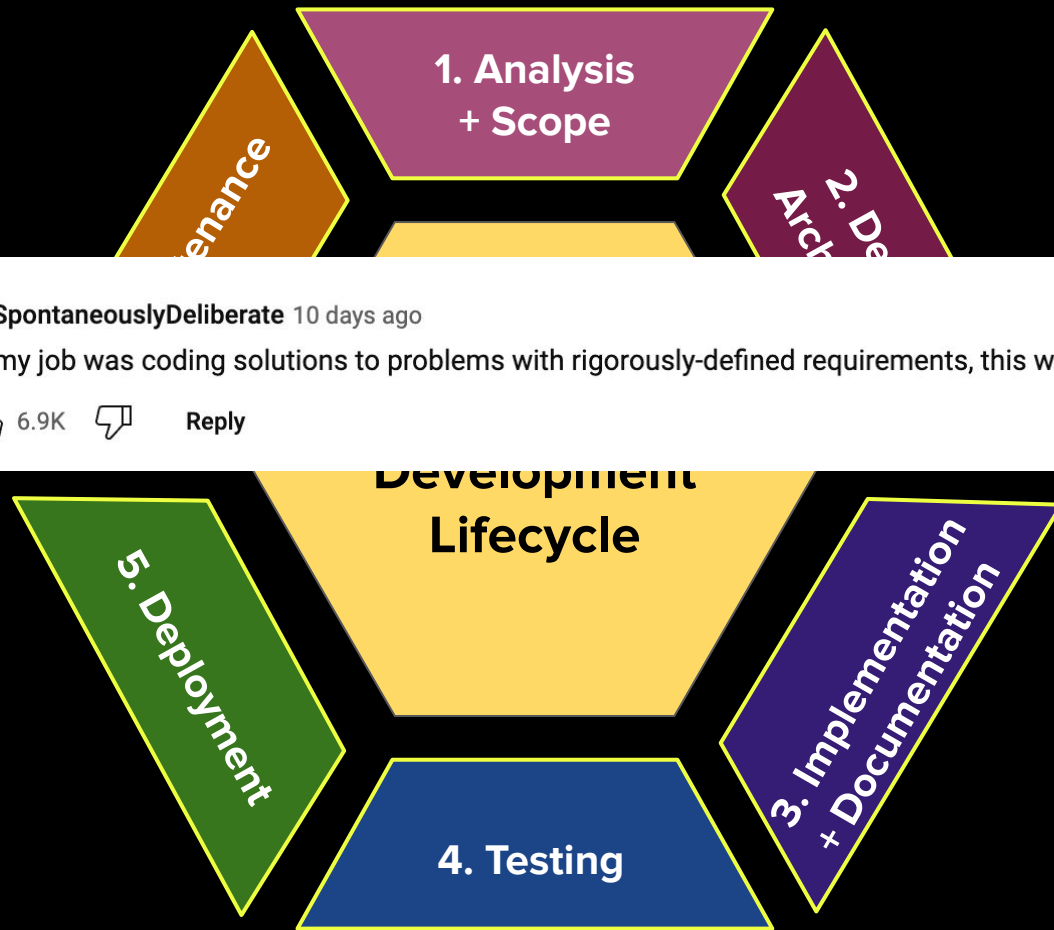


LangChain4j



**How can AI help  
with software development?**





@SpontaneouslyDeliberate 10 days ago

If my job was coding solutions to problems with rigorously-defined requirements, this would be concerning.

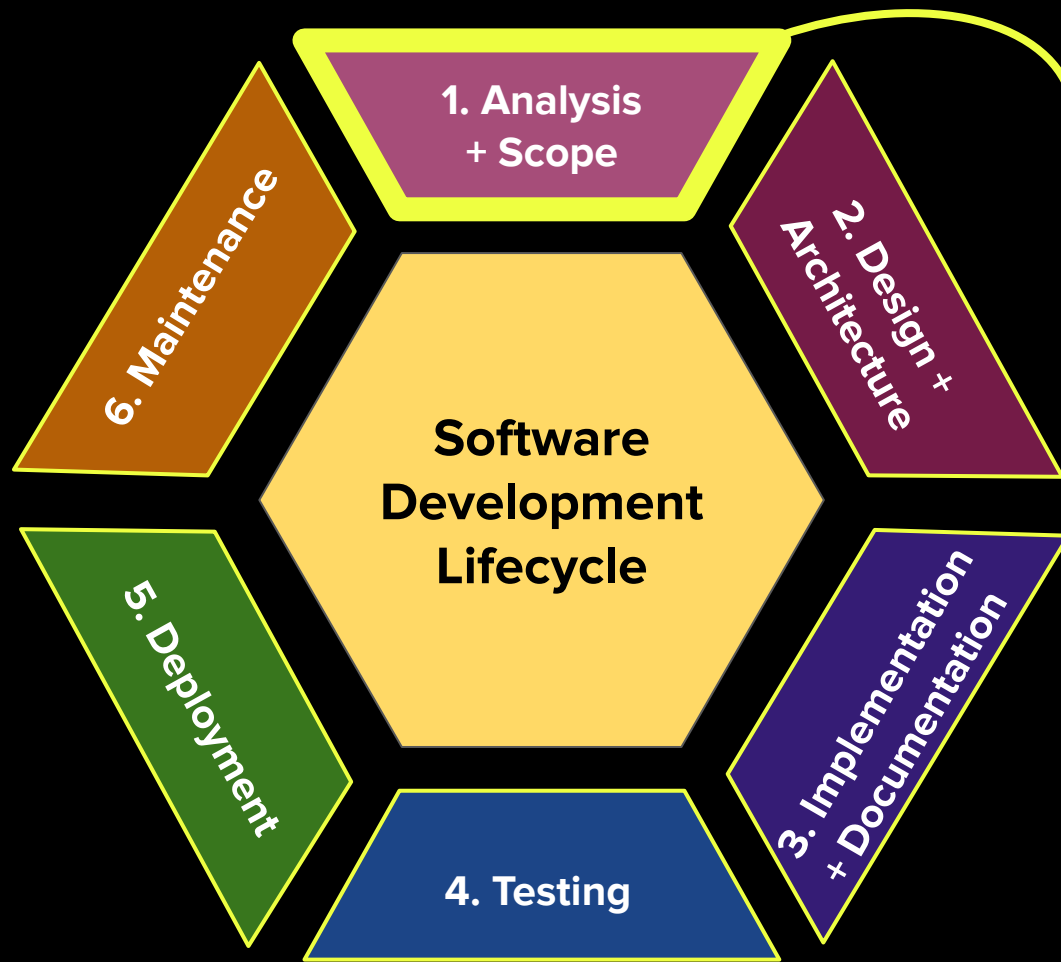


6.9K

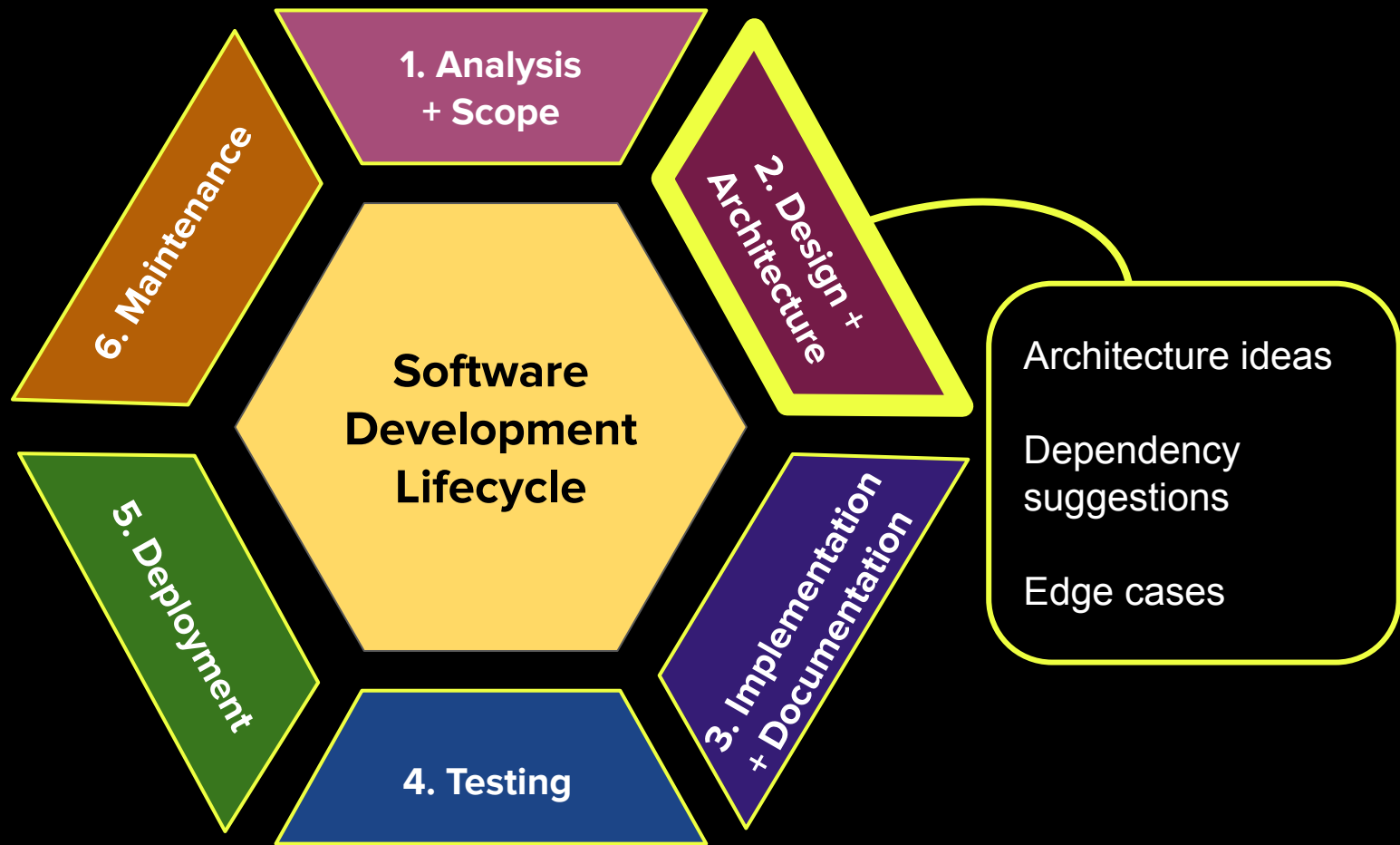


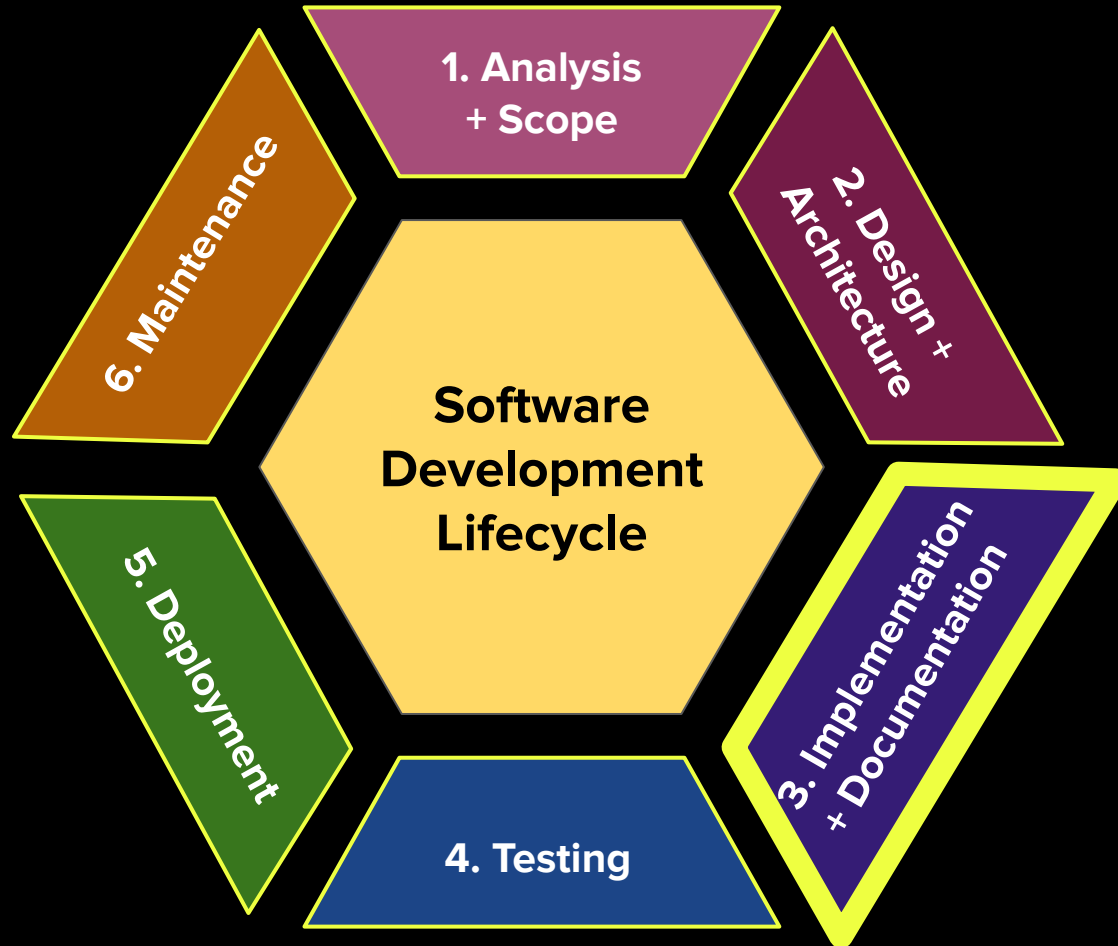
Reply





Elaborate idea  
Estimate efforts  
Split into tasks





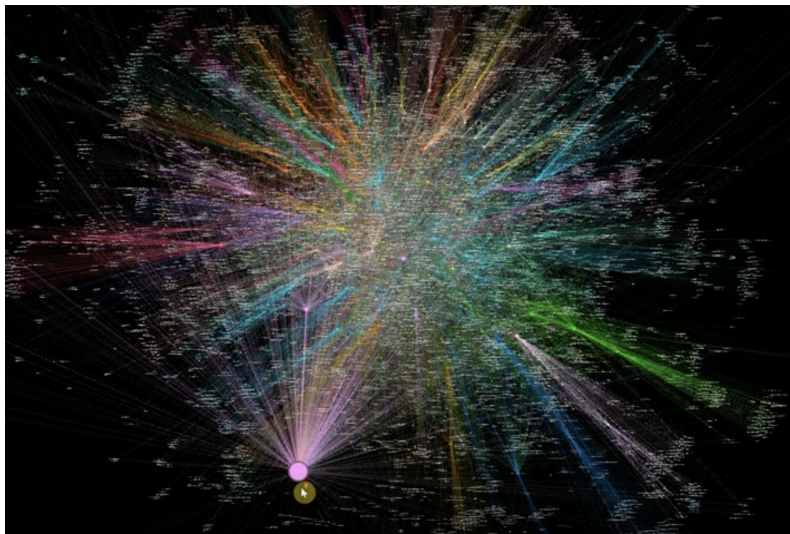
# The Most Popular Programming Languages by Decade

The start of a new programming era driven by generative AI

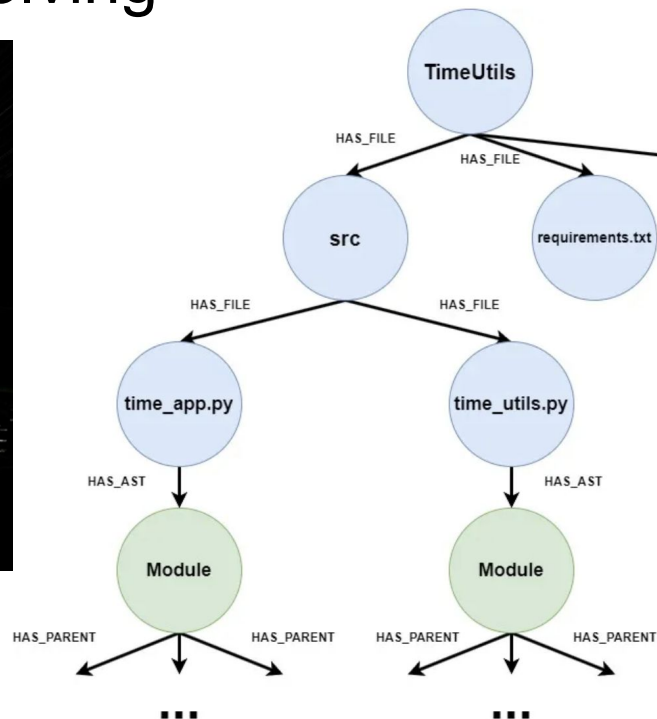
	1970	1980	1990	2000	2010	2020	2030
1st	Fortran	Pascal	C	C	Java	Python	English
2nd	COBOL	Fortran	Ada	Java	JavaScript	JavaScript	Mandarin
3rd	Assembly	BASIC	Pascal	JavaScript	PHP	Java	Hindi
4th	ALGOL	C	C++	C++	C++	C#	Spanish
5th	BASIC	Ada	Fortran	PHP	C	PHP	French
6th	APL	COBOL	Lisp	Visual Basic	Python	C++	Arabic

<https://www.linkedin.com/company/nabooai>

# Coding Assistants are evolving



GraphRAG



Courtesy  
Cyril Sadovsky,  
Zimin Chen and  
colleagues at  
Deutsche  
Telekom

## Advanced Coding Assistants

<https://medium.com/@cyrilsadovsky/advanced-coding-chatbot-knowledge-graphs-and-asts-0c18c90373be>  
<https://medium.com/@ziche94/building-knowledge-graph-over-a-codebase-for-llm-245686917f96>

# Coding Assistants are evolving

```
Current File ▾ ▶ 🔍 🔄 🏠 🌐
```

DevoxxGenie

Ollama

phi3:latest

New conversation 20 June '24 07:44

**New features** 🚀

Enable these new features in the settings page.

- 🔍 **Web Search:** Search the web for a given query using Google or Tavily
- 🌊 **Streaming responses (beta):** See each token as it's received from the LLM in real-time
- 🧠 **Abstract Syntax Tree (AST) context:** Automatically include parent class and class/field references in the prompt for better code analysis. Ensure the LLM has a large enough context window
- 💬 **Chat Memory Size:** Set the size of your chat memory, by default its set to a total of 10 messages (system + user msgs)

Utility commands are:

```
/test : generate a unit test
/review : generate a code review
/explain : explain the code
/custom : custom prompt (define in Settings)
```

## devoxx/ **DevoxxGenieIDEAPugin**

DevoxxGenie is a plugin for IntelliJ IDEA that uses local LLM's (Ollama, LMStudio, GPT4All and Jan) and Cloud based LLMs...



cursor.com

# The AI Code Editor

```
1802   onStream={async (stream) => {
1803     return await props.onReturn(
1804       (async function* () {
1805         let buffer = "";
1806         let state: "outside" | "newline" = "outside";
1807         let state: "outside" | "newline" | "inside" = "outside";
1808         for await (const datum of stream) {
1809           const newToken = datum.content;
1810           for (const char of newToken) {
1811             if (state === "inside") {
1812               buffer += char;
1813             if (char === "\"" && state !== "newline") {
1814               if (state === "outside") {
1815                 state = "newline";
```

add an inside case

⌘ Cancel ...

gpt-4 ⌘K to toggle



## Feedback Analyzer for a Coding Workshop

Age

34

Gender

Female

Country

Switzerland

Free Feedback

Super interesting examples. The room was a bit chilly though.

Submit

## Analysis Component

**Feedback Type:** PositiveFeedback

**Urgency:** 0%

**Severity:** 0%

**Impact:** 100%

**Feedback:** Super interesting examples!

**Category:** Examples

**Feedback Type:** Problem

**Urgency:** 20%

**Severity:** 10%

**Impact:** 100%

**Feedback:** The room was a bit chilly though.

**Category:** RoomEnvironment



# The AI Code Editor

## 2. Update the JavaScript to Include the Profession Field

Modify the JavaScript to capture the `profession` field value and include it in the `feedbackData` object.

```
<> feedback.html  ⏪ Ask  📄 Copy  ▶ Apply

startLine: 61
endLine: 70
var profession = document.getElementById("profession").value;

var feedbackData = {
  age: age,
  gender: gender,
  profession: profession,
  country: country,
  feedback: feedback
};
```

## 3. Update the FeedbackDTO Class

Add a `profession` field to the `FeedbackDTO` class.

```
J FeedbackDTO.java  ⏪ Ask  📄 Copy  ▶ Apply

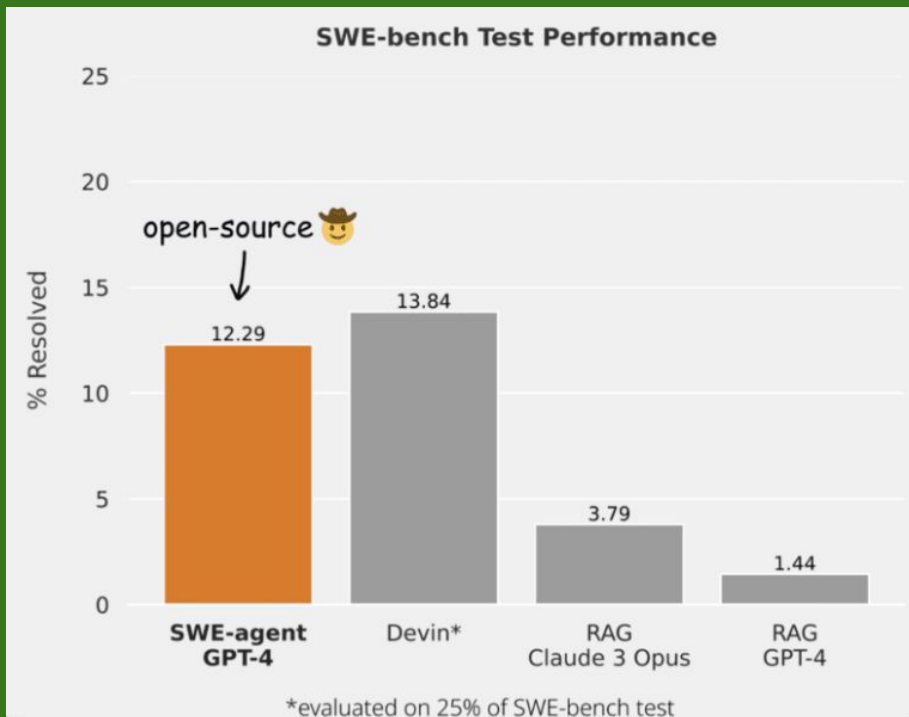
private String profession;

public String getProfession() {
    return profession;
}

public void setProfession(String profession) {
```



# SWE-agent



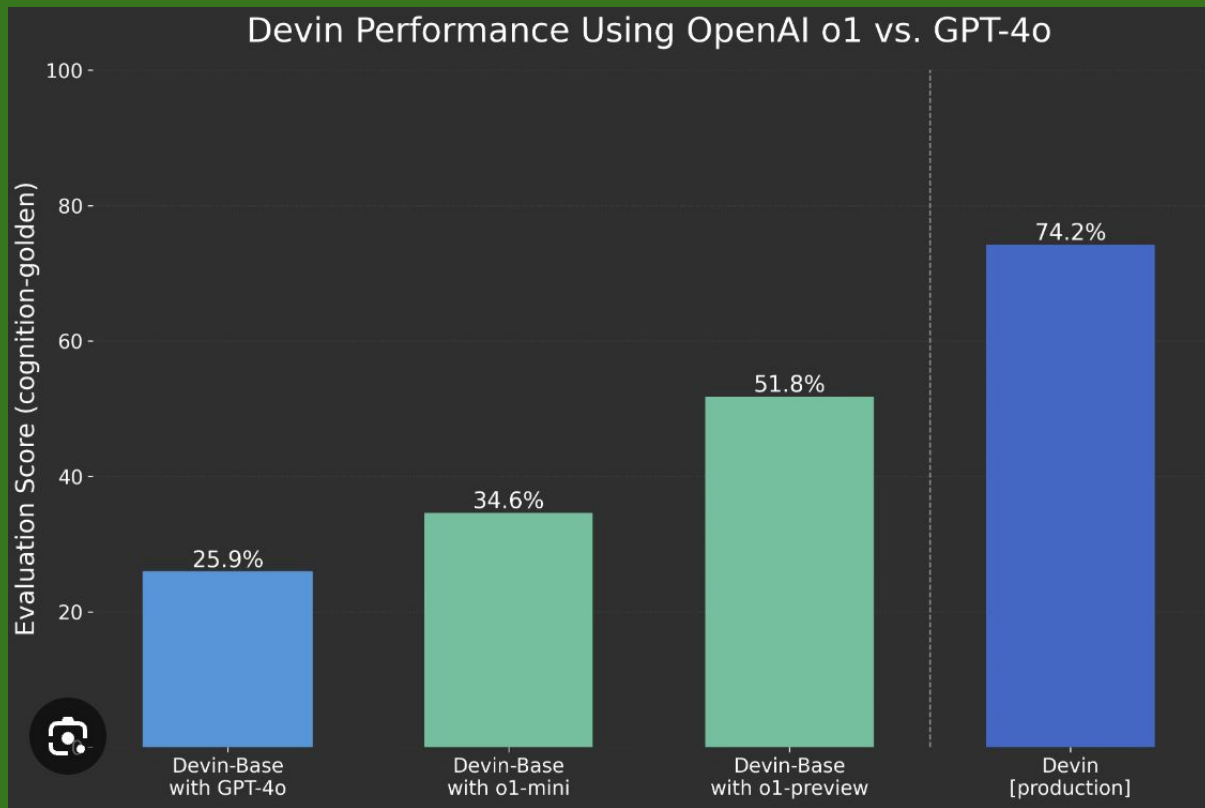
<https://github.com/princeton-nlp/SWE-agent>



@LizeRaes



LangChain4j





Console + [Icons] 1 / 3 Build the initial prototype

→ Devtools New tab

## Welcome to our Webshop

<b>Laptop</b> High-performance laptop Price: \$999.99 <input type="button" value="Add to Cart"/>	<b>Smartphone</b> Latest model smartphone Price: \$699.99 <input type="button" value="Add to Cart"/>
<b>Headphones</b> Noise-cancelling	<b>Tablet</b> 10-inch tablet with retina

sources Settings

Method	Status	Type	Size	Time

1 / 3 Presented results to the user

Is the main page loading correctly? Are the products being displayed on the page?

3 minutes ago

yes. the assistant is not fetching properly though. can you implement an assistant running on localhost:8080/helpful-assistant with langchain yourself, that will send back a list of proposed product names, based on the user question, using the aforementioned tools `getAllProducts()` and `getProductDescription(productName)`?

Just now • Read

I'm implementing a new AI assistant using Langchain as requested. This will run on localhost:8080/helpful-assistant and propose product names based on user questions. I'll update you once the implementation is complete and tested.

Just now


Created assistant.py

Installing langchain, openai...

# PRs and Collaboration

**GITMERGE**






**coderabbitai**  
GitHub App

```
@@ -37,6 +37,8 @@ public OllamaClient(String baseUrl, Duration timeout) {
37 37         .connectTimeout(timeout)
38 38         .readTimeout(timeout)
39 39         .writeTimeout(timeout)
40 +         .addInterceptor(new OllamaRequestLoggingInterceptor())
41 +         .addInterceptor(new OllamaResponseLoggingInterceptor())
```

HashJang marked this conversation as resolved. [Show resolved](#)

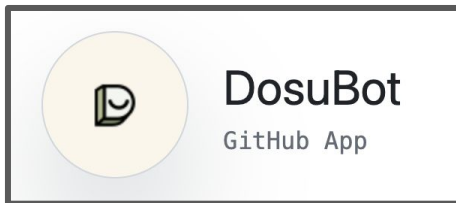
HashJang marked this conversation as resolved. [Hide resolved](#)

 **coderabbitai** (bot) on Mar 8

The addition of logging interceptors directly in the constructor does not allow for configurable logging. Consider implementing a builder pattern to make logging configurable, as suggested in previous review comments. This approach would provide more flexibility to enable or disable logging as needed.

# PRs and Collaboration

**GITMERGE**



**dosubot** (bot) commented on May 11 • edited ▾

The warning about the `ManagedChannel` not being properly shut down is due to the lifecycle management of the `VertexAI` instance within your `VertexAiGeminiChatModel`. To resolve this, you should manage the `VertexAI` instance's lifecycle alongside the `VertexAiGeminiChatModel` object, ensuring it's properly closed when no longer needed.

Here's a concise approach to fix the issue:

1. **Remove the `VertexAI` instance from the try-with-resources statement** in the constructor of `VertexAiGeminiChatModel`. This change prevents the instance from being automatically closed at the end of the constructor's scope, which is not suitable since the instance is used beyond the constructor.
2. **Store a reference to the `VertexAI` instance** within the `VertexAiGeminiChatModel` class. This allows you to access the instance throughout the lifecycle of the `VertexAiGeminiChatModel` object.
3. **Implement a `close` method** in the `VertexAiGeminiChatModel` class that explicitly closes the `VertexAI` instance. This method should be called when the `VertexAiGeminiChatModel` object is no longer needed to properly release resources.

By implementing these steps, you ensure that the `VertexAI` instance is properly closed, addressing the warning message and managing resources effectively.

► Details

To continue the conversation, mention [@dosu](#).



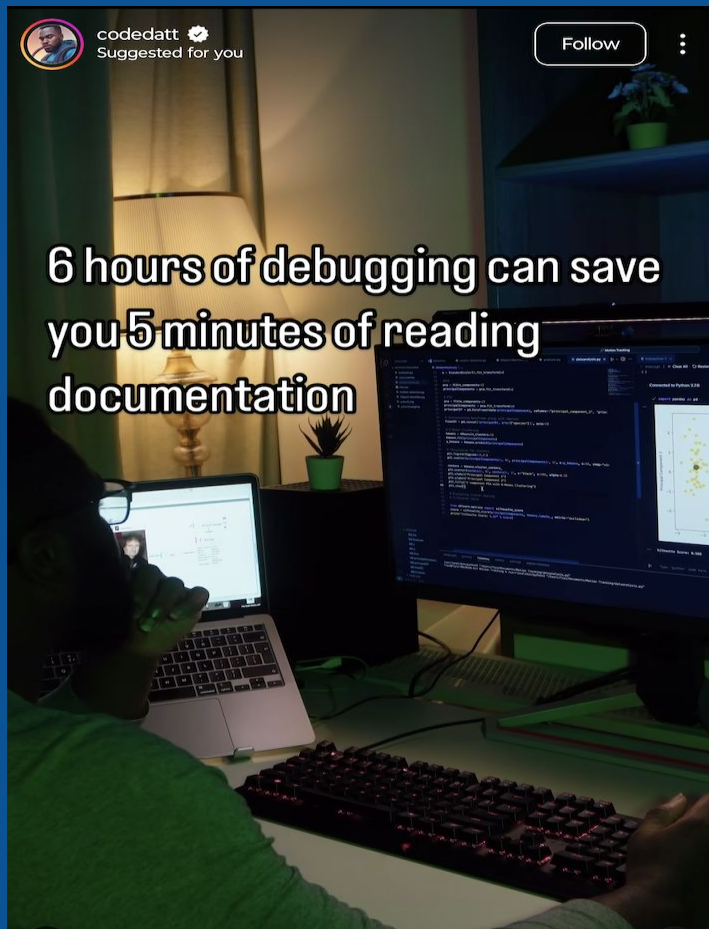
@LizeRaes

naboo.ai



LangChain4j

# Documentation



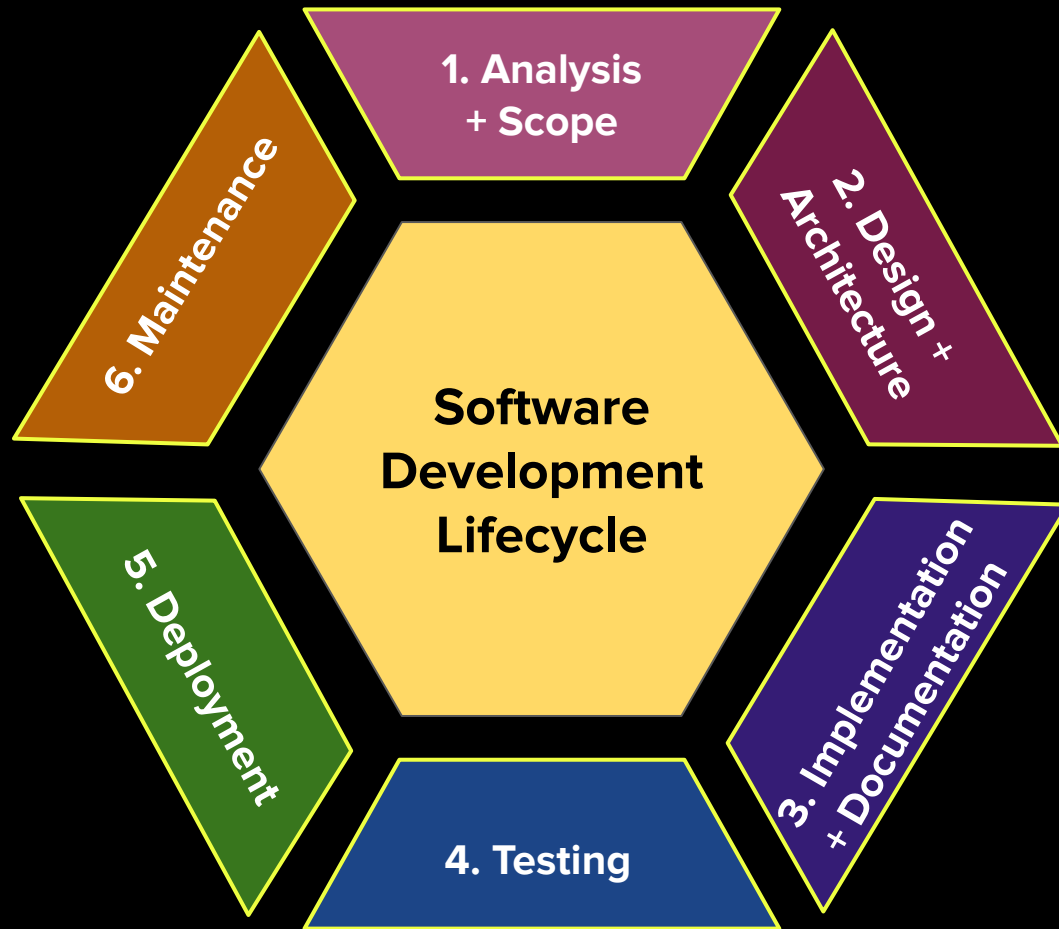
@LizeRaes

naboo.ai



LangChain4j





**Software  
Development  
Lifecycle**

**1. Analysis  
+ Scope**

**2. Design +  
Architecture**

**3. Implementation  
+ Documentation**

**4. Testing**

**5. Deployment**

**6. Maintenance**

Generate unit tests

Help writing integration tests

Generate synthetic test and demo data

**Software  
Development  
Lifecycle**

1. Analysis  
+ Scope

2. Design +  
Architecture

3. Implementation  
+ Documentation

4. Testing

5. Deployment

6. Maintenance

Automated  
(tailored) release  
notes

Diffs and  
affected code

Assistance with  
server setup,  
config files, ...

1. Analysis  
+ Scope

2. Design +  
Architecture

3. Implementation  
+ Documentation

4. Testing

5. Deployment

6. Maintenance

Software  
Development  
Lifecycle

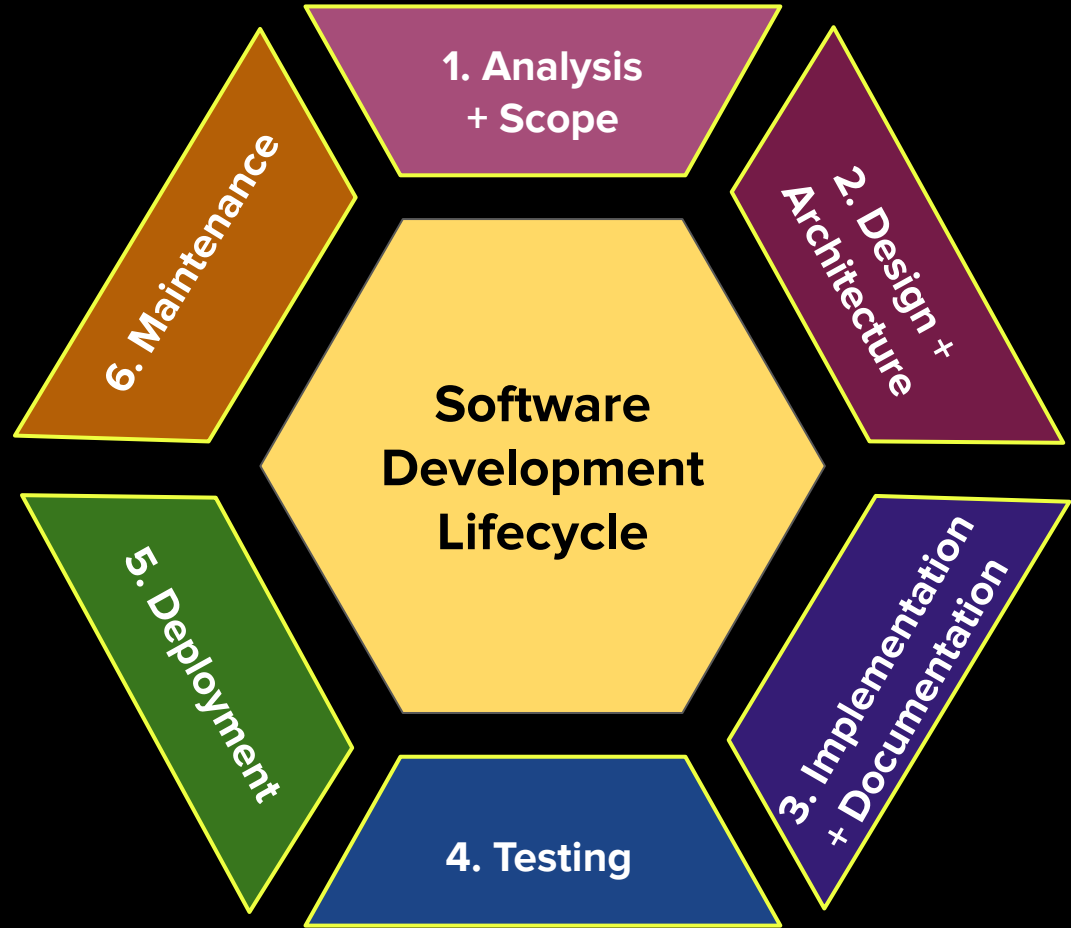
AI-powered  
logfile analysis

Automated bug  
ticket dispatching

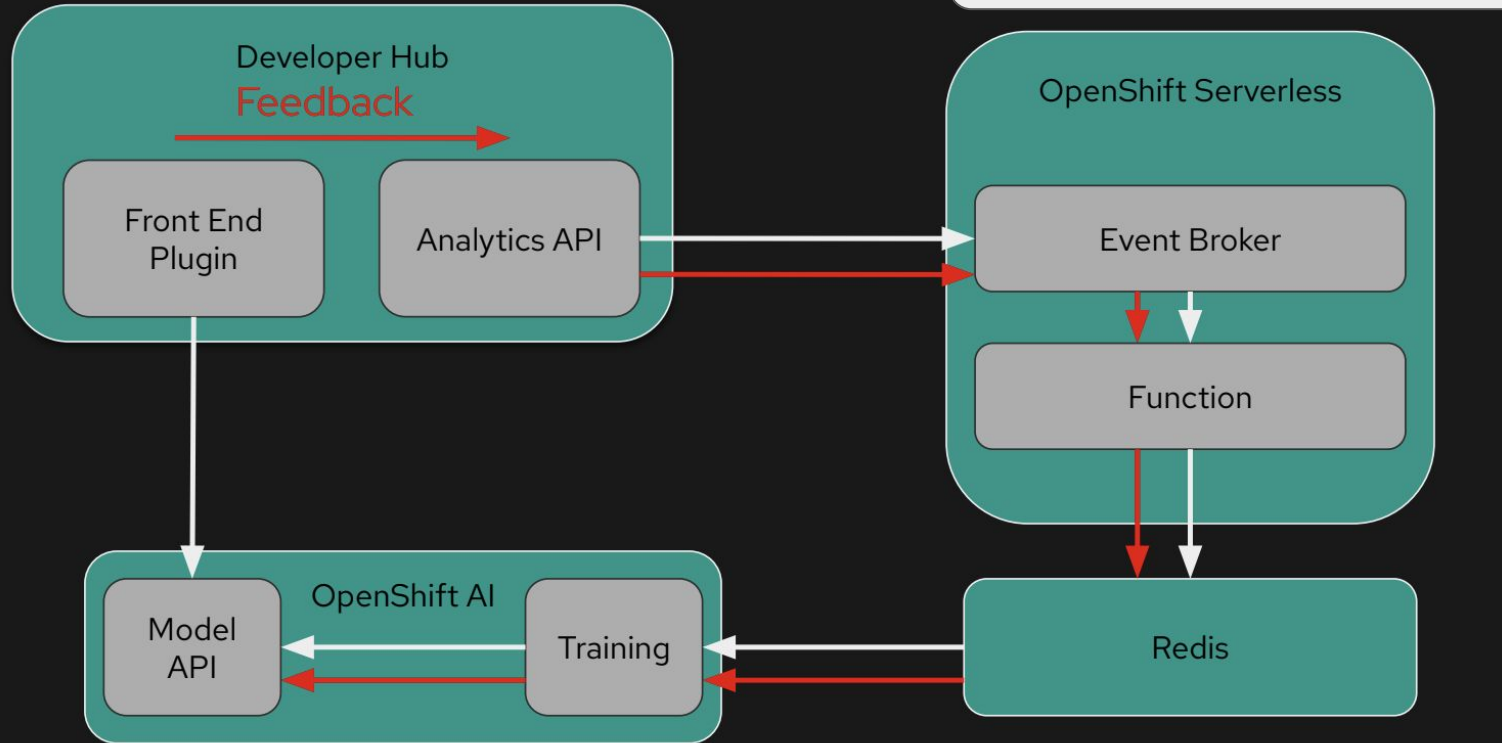
Intelligent joint  
planning of  
bugfixes + new  
features

Break the information silos by allowing intelligent joint search in

- Tech Specs
- Jira Tickets
- Code
- Bug Reports
- Documentation
- ...



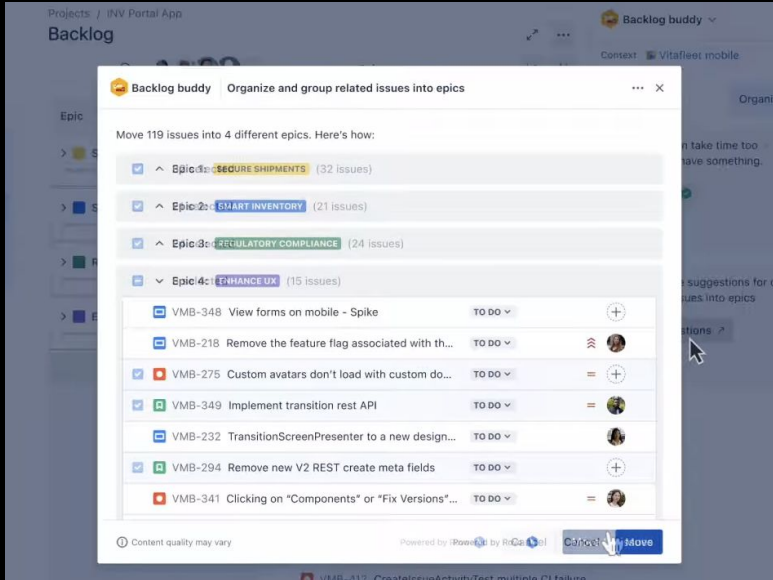
Register Dev ID + Event (Action + Subject)  
Predict next Event



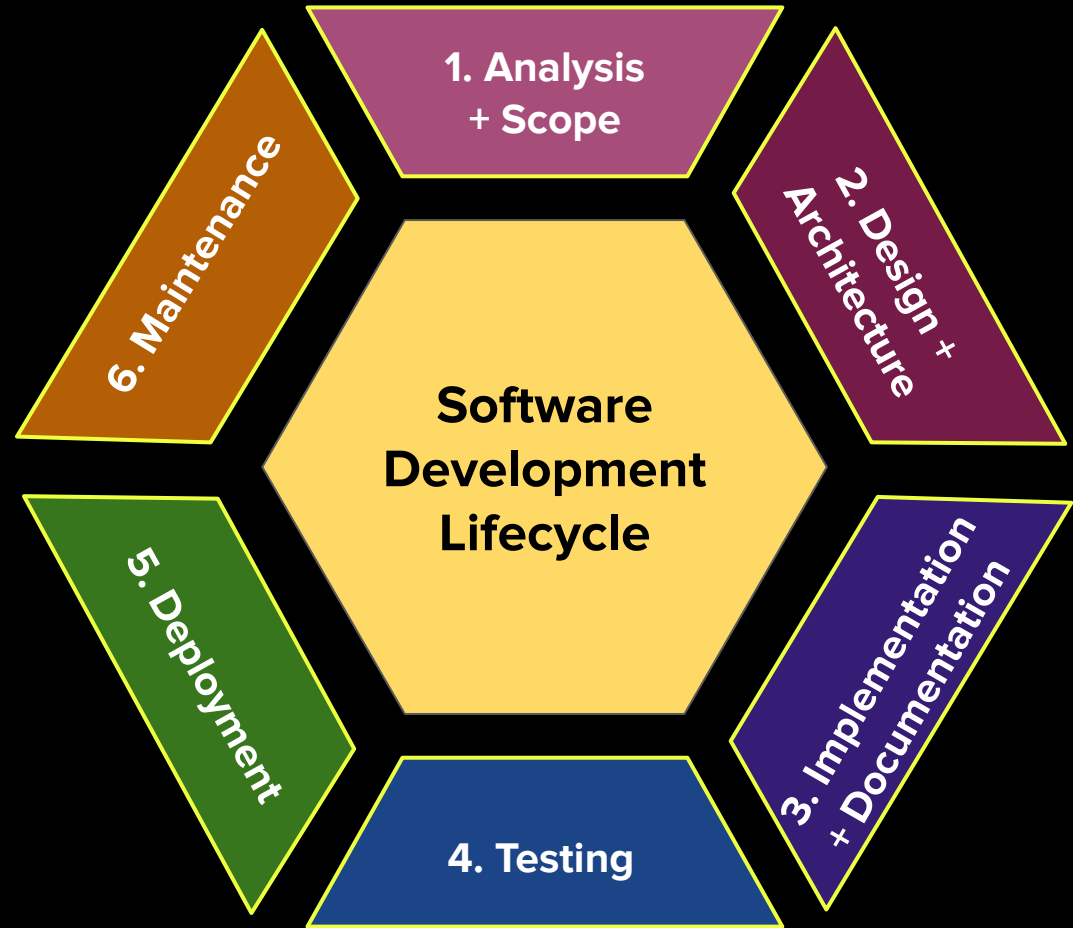
Kyra Goud and Josephine Pfeiffer  
[github.com/pfeifferj/backstage-ai-demo](https://github.com/pfeifferj/backstage-ai-demo)



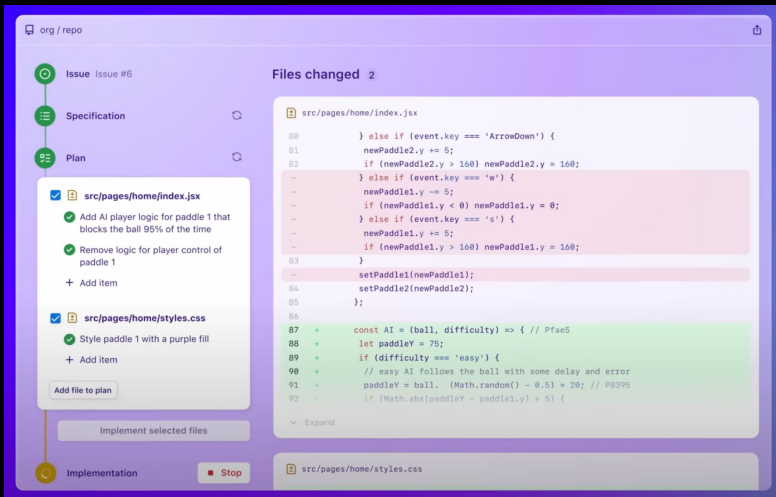
# ATLASSIAN Rovo



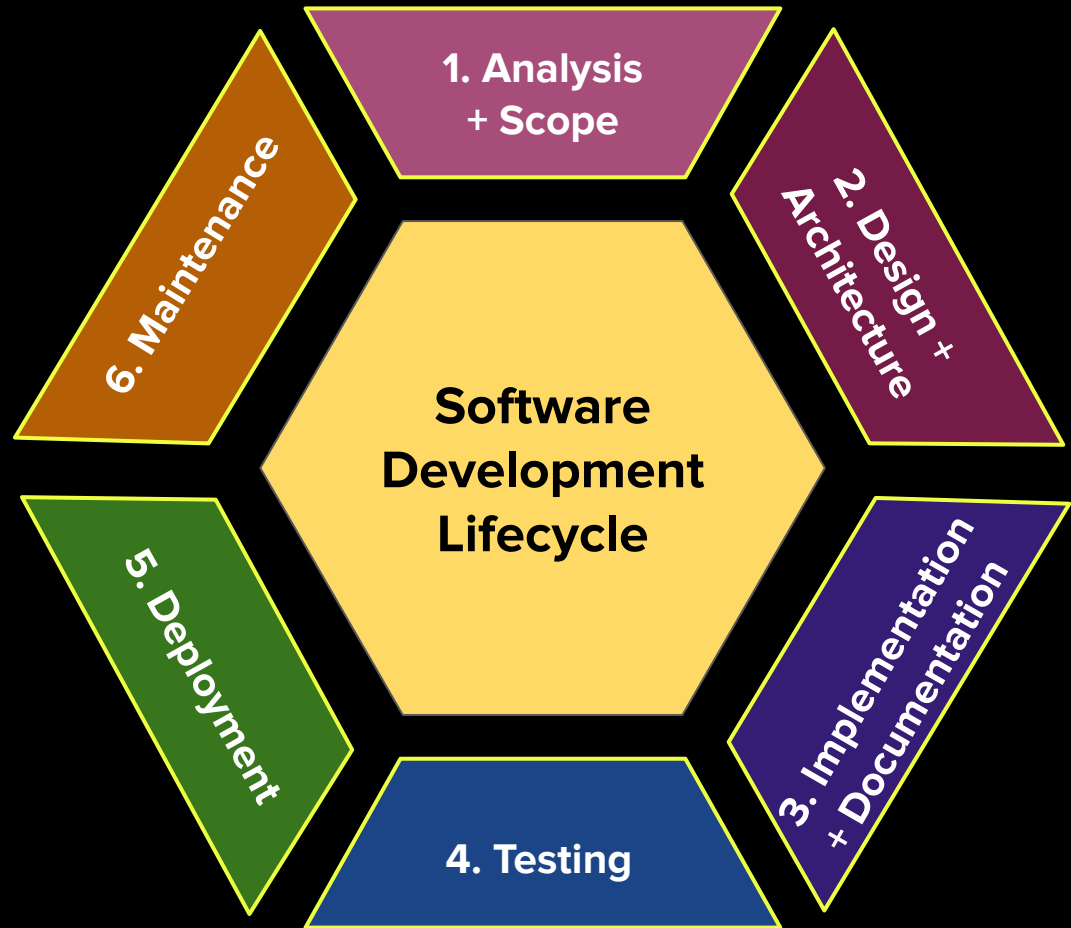
\* waitlist



# GitHub Copilot Workspace



\* waitlist





Specification ⓘ

Are there proper methods to store the ordered product for the user(id) in the database when the order is placed?

Current behavior 🗨️

- No, there are no proper methods to store the ordered product for the user(id) in the database when the order is placed.
- `src/main/java/engineering/epic/databases/ShoppingDatabase.java` has a method `saveOrder` to save orders, but it does not use the user(id) and assumes client\_id and product\_id as 1.
- `src/main/java/engineering/epic/endpoints/HelpfulAssistantResource.java` handles order placement but does not call any method to store the order in the database.
- `src/main/java/engineering/epic/tools/OrderTools.java` has a method `displayShoppingCart` but does not store the order in the database.
- No method in the provided files properly stores the ordered product for the user(id) in the database when the order is placed.

+ Add item

Proposed solution 🗨️

- Yes, there are now proper methods to store the ordered product for the user(id) in the database when the order is placed.
- `src/main/java/engineering/epic/databases/ShoppingDatabase.java` now has a method `saveOrder` that uses the user(id) to store the order in the database.
- `src/main/java/engineering/epic/endpoints/HelpfulAssistantResource.java` now calls the `saveOrder` method to store the order in the database when the order is placed.

# GitHub Copilot Workspace

Task IN OrderTools, storeOrder(int userId, String productNam... ↕

Specification ↕ ↻ 🗑️ ↕

Plan ⓘ ↕ ↻ 🗑️ ↕

- `src/main/java/engineering/epic/models/Order.java` ↕
  - ✓ Add `userId` field with getter and setter methods
  - ✓ Add `productName` field with getter and setter methods
  - ✓ Add `quantity` field with getter and setter methods
  - + Add item
- `src/main/java/engineering/epic/tools/OrderTools.java` ↕
  - Update `storeOrder` method to call the new `Order` methods for `userId`, `productName`, and `quantity`
  - + Add item

View references

Files changed 2

Uncommitted changes

`src/main/java/engineering/epic/models/Order.java`

```
1 package engineering.epic.models;
2
3 import java.util.List;
4 import java.util.Objects;
5
6 public class Order {
7     private String clientName;
8     private String address;
9     private List<CartItem> items;
10    private double total;
11
12    public Order() {}
13
14    public Order(String clientName, String address,
15                this.clientName = clientName;
16                this.address = address;
17                this.items = items;
18                this.total = total;
19    }
20 }
```

```
1 package engineering.epic.models;
2
3 import java.util.List;
4 import java.util.Objects;
5
6 public class Order {
7     private String clientName;
8     private String address;
9     private List<CartItem> items;
10    private double total;
11+   private int userId;
12+   private String productName;
13+   private int quantity;
14
15    public Order() {}
16
17    public Order(String clientName, String address,
18                this.clientName = clientName;
19                this.address = address;
20                this.items = items;
21                this.total = total;
22    }
23 }
```



The screenshot shows a GitHub pull request page for the repository 'booi / naboo-ai'. The pull request title is 'feat(NBU-972): hide PRs tab when there is no PR in' and it is currently 'Open'. The pull request was created by 'royhadad' and is targeting the 'develop' branch. A chat window titled 'Chat with Naboo on PR #745' is overlaid on the right side of the page. The chat contains a message from 'naBOT' providing instructions on how to test the feature. The instructions are as follows:

**Chat with Naboo**  
on PR #745

naBOT

To test the feature implemented in the pull request [feat\(NBU-972\): hide PRs tab when there is no PR integration](#), you can follow these steps:

- 1. Verify the Integration Status:**
  - Ensure that there are no PR integrations installed. This can be done by checking the configuration or settings where integrations are managed. The relevant integrations are defined in the code snippet provided in the ticket  [Hide PRs tab when there is no pull request integration installed](#).
- 2. Check the UI Behavior:**
  - Open the application and navigate to the section where the PRs tab is usually displayed.
  - Confirm that the PRs tab is hidden when there are no PR integrations installed.

A futuristic, glowing blue tunnel with a grid-like structure, viewed from the center looking outwards. The tunnel is composed of concentric rings of dark blue, rectangular segments, each illuminated from within, creating a strong perspective effect. The lighting is a vibrant cyan-blue, and the overall atmosphere is high-tech and mysterious.

**Things to watch out for**

# Tech debt?



Kevlin Henney

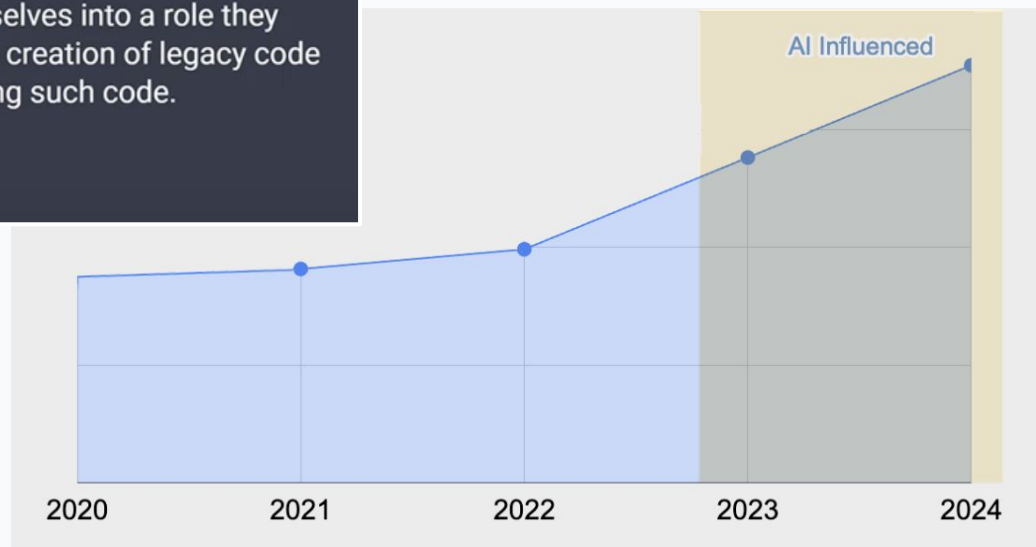
@kevin@mastodon.social

The practical consequence of using LLMs to generate code is that many developers will find they have unwittingly moved themselves into a role they were probably trying to avoid: they have automated the creation of legacy code and have redefined their job role as debugging and fixing such code.

Apr 03, 2023, 18:30 · Web · 442 · 583

mastodon.social/@kevin/110136069252675177

## Code Churn by Year



[gitclear.com/coding\\_on\\_copilot\\_data\\_shows\\_ais\\_downward\\_pressure\\_on\\_code\\_quality](https://gitclear.com/coding_on_copilot_data_shows_ais_downward_pressure_on_code_quality)



@LizeRaes

naboo.ai

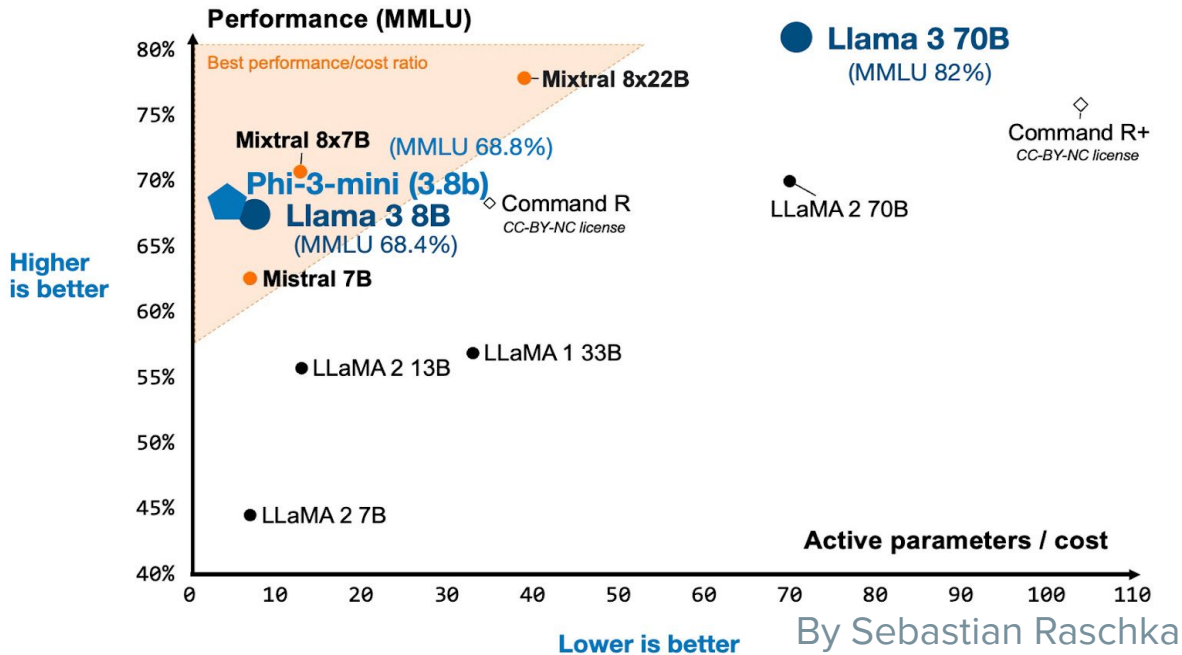


LangChain4j

# Resources and Climate?



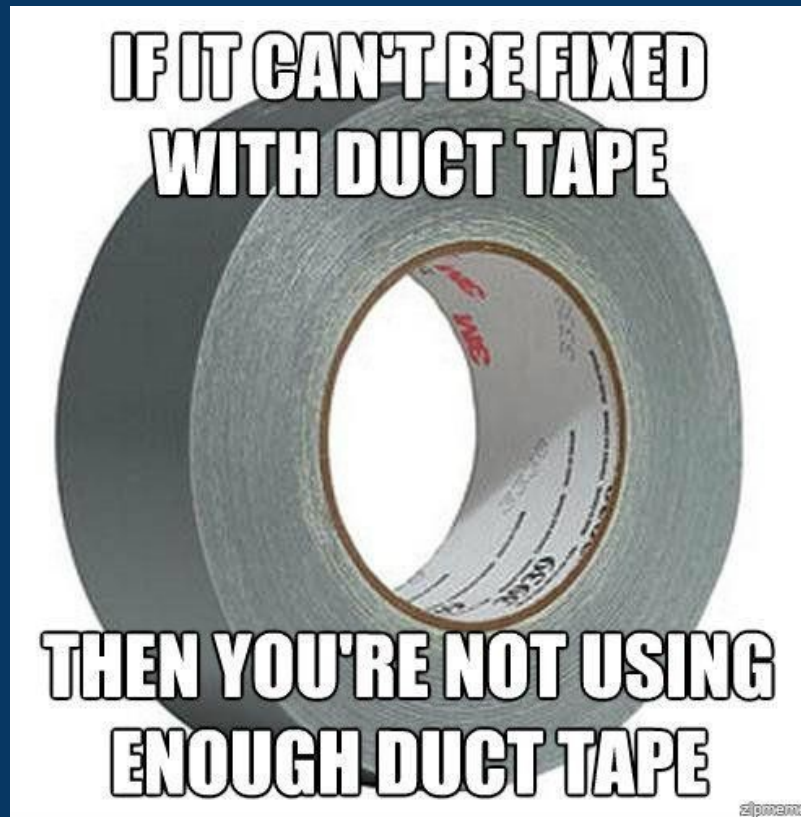
Serves code completions for up to 200 devs for ~200W



- Model size goes down
- Quality goes up
- Emerging tiny specialized models



# Will AI solve all your problems?



# Will AI solve all your problems?



@LizeRaes

naboo.ai



LangChain4j



# Use the right tool for the job



# Best applications today

- 👍 Code writing:  
boilerplate and repetitive code
- 👉 Changes to end-user code  
(not affecting too many classes)
- 👏 Test and test data generation
- 📖 Assistance with unfamiliar tasks,  
frameworks and programming languages
- 💪 Integrated search over data lake

Not good enough for:

- 😬 Changes to spiderweb code
- 😞 Refactoring
- 😬 Generating complex code  
over multiple classes

**Will it come? Quite certainly yes!**

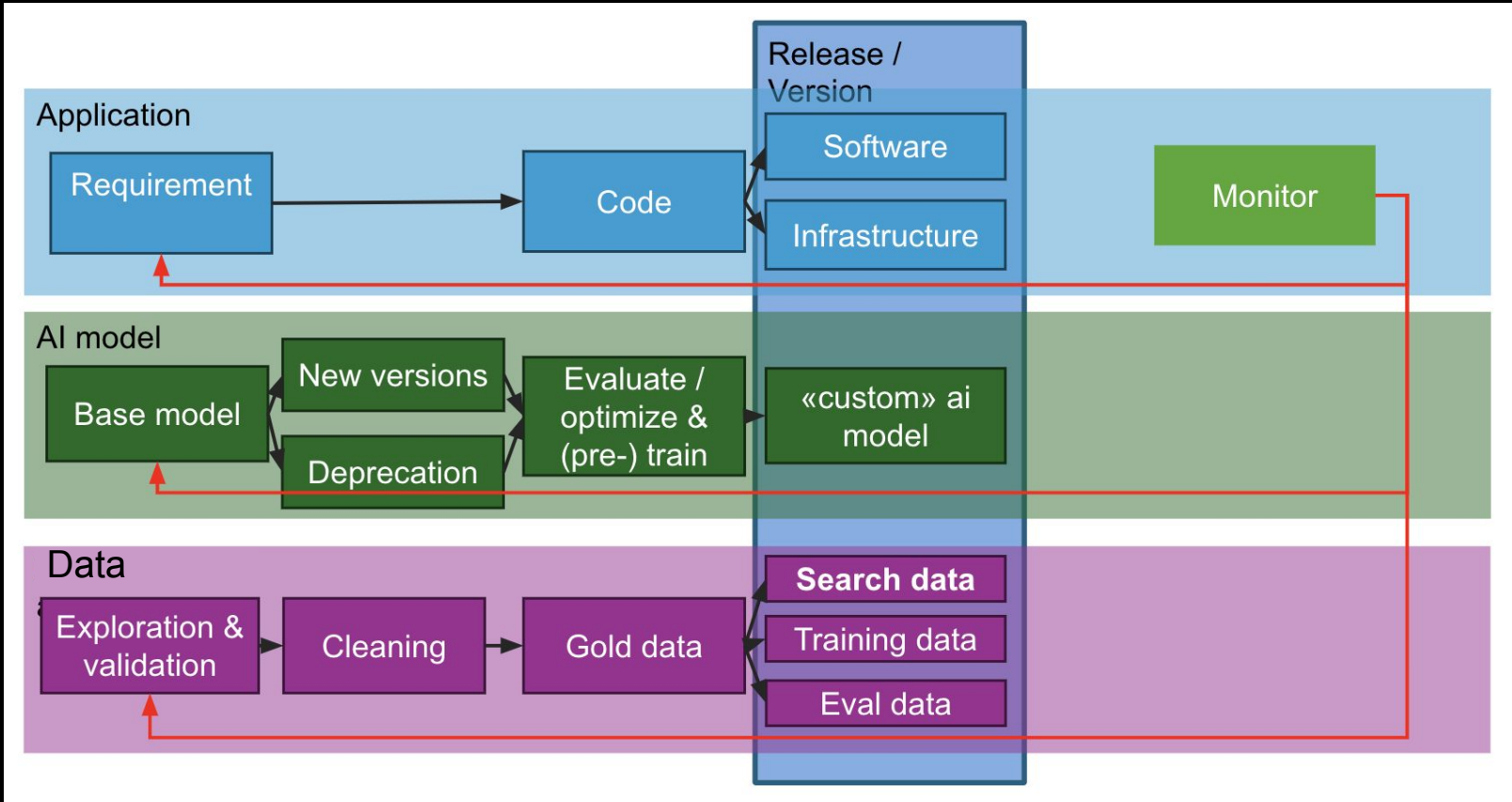


A futuristic, dark blue tunnel with glowing blue rings and a central text overlay. The tunnel is composed of concentric, slightly offset rings that create a sense of depth and perspective. The rings are illuminated from within, casting a bright blue glow. The overall aesthetic is high-tech and digital.

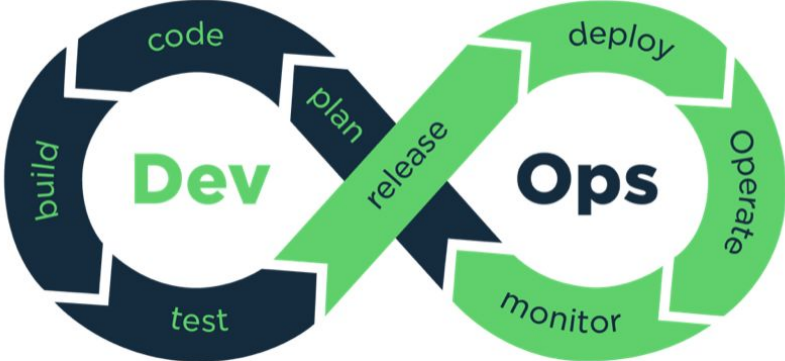
**How to build apps with AI?**

# AI application stack

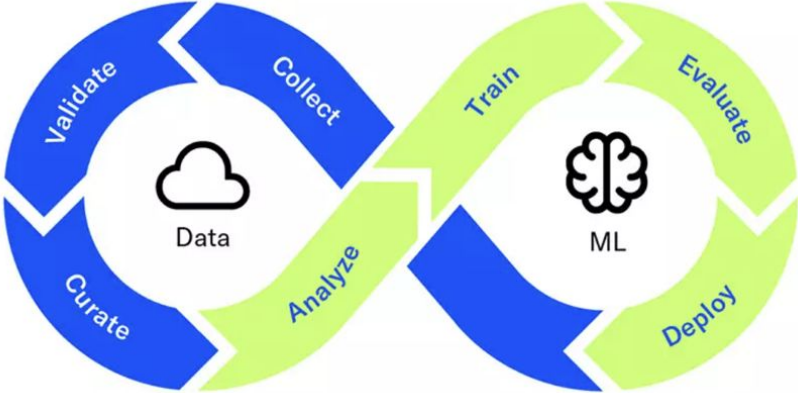
By Tobias Kluge, Nexlore AG

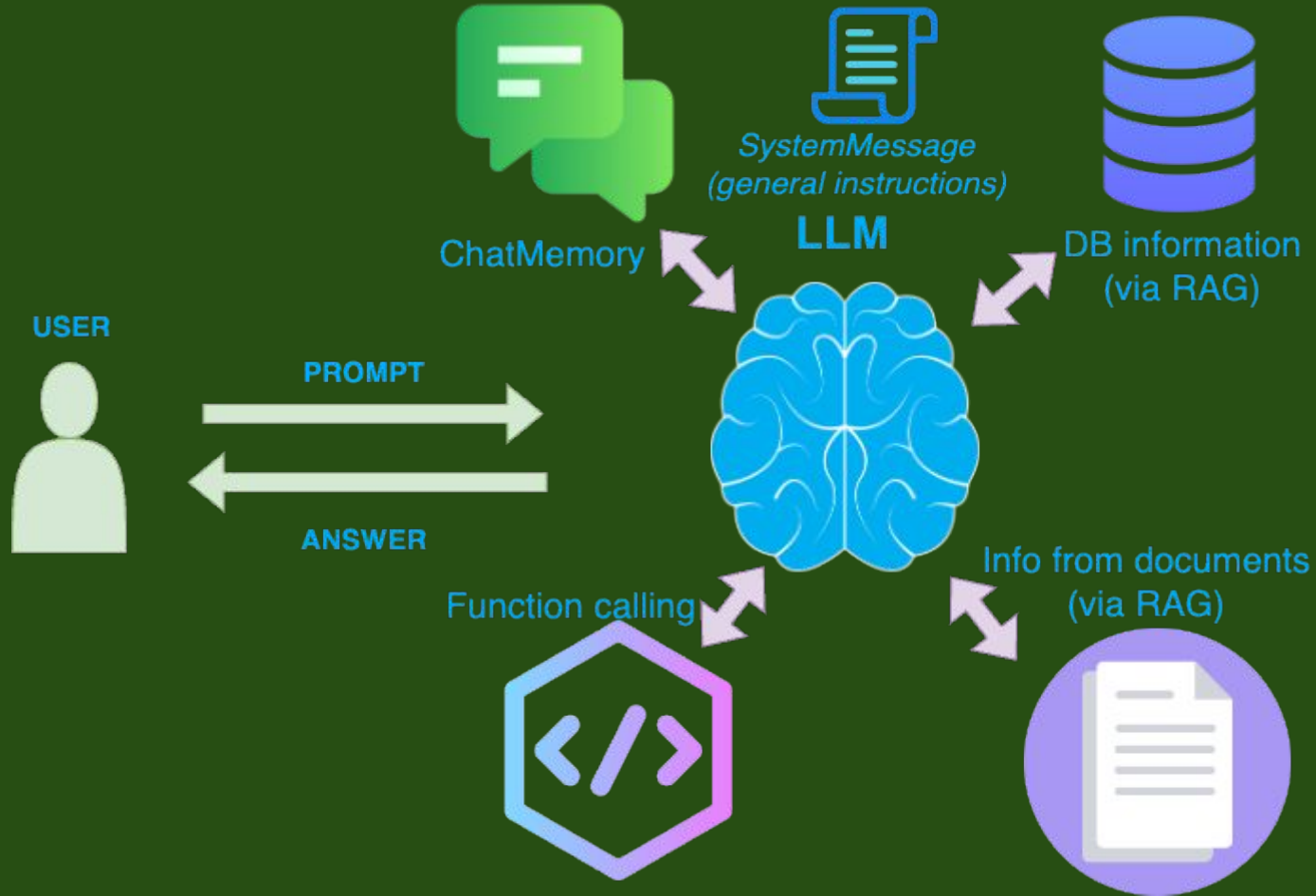


# Using models to build apps on top

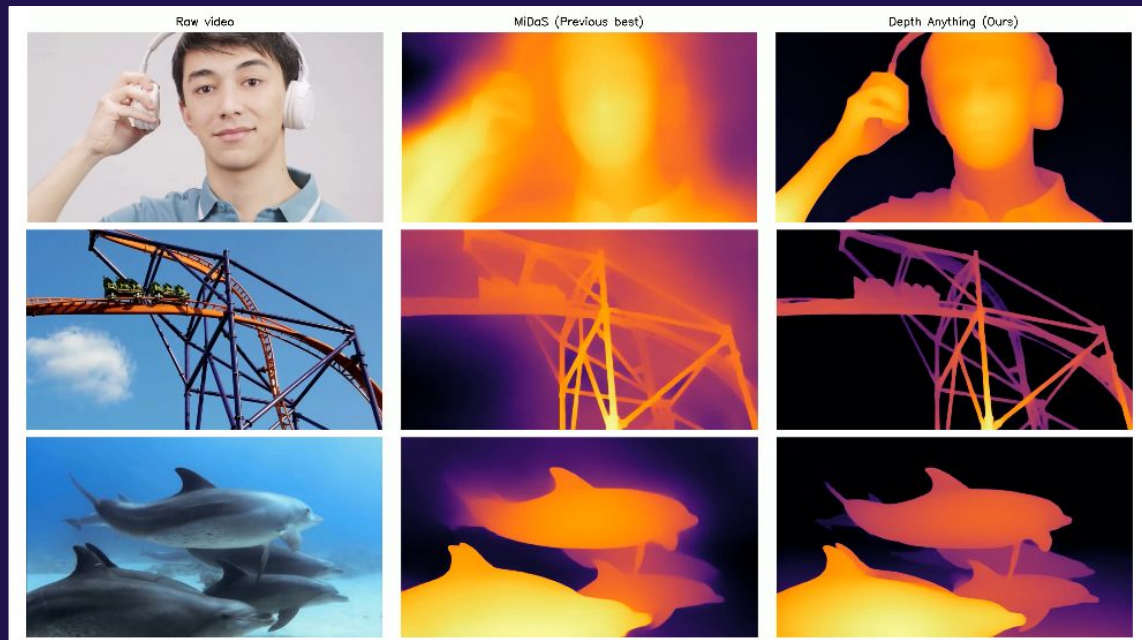


API





# Models predicting anything



## Depth Anything



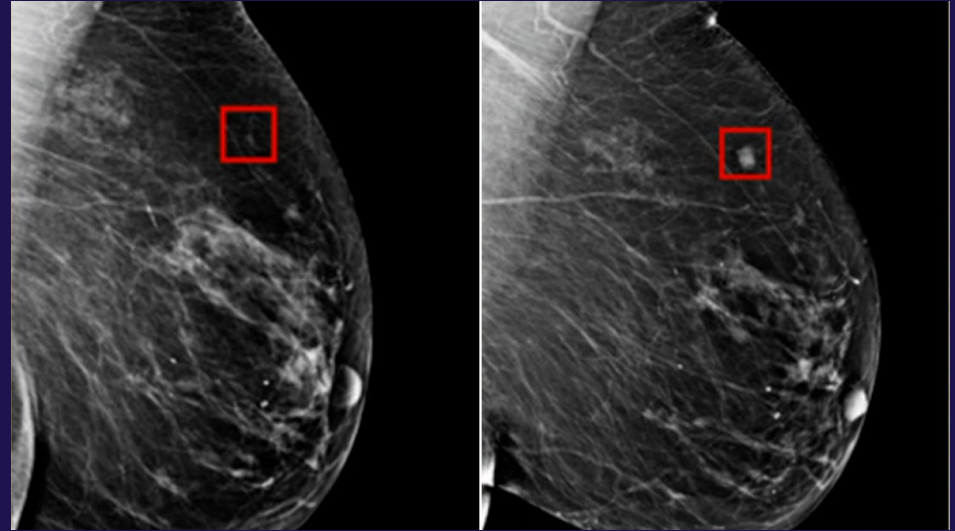
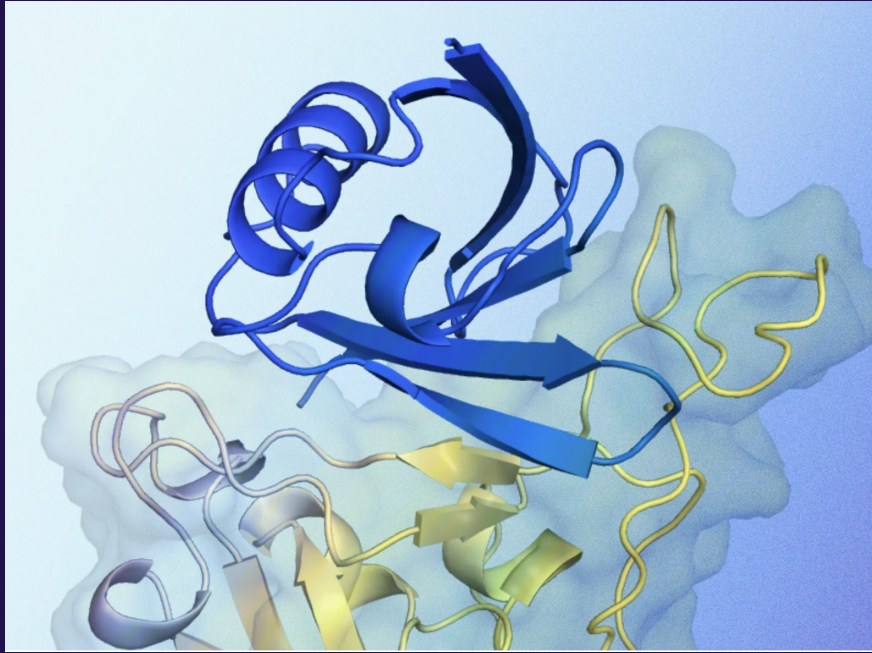
@LizeRaes

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# Models predicting anything



Breast cancer detection

Google DeepMind AlphaProteo



# Technologies

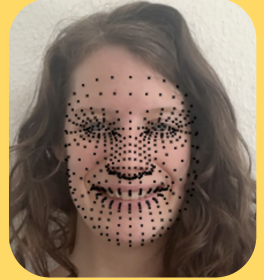


Via API

GPU Access in Java

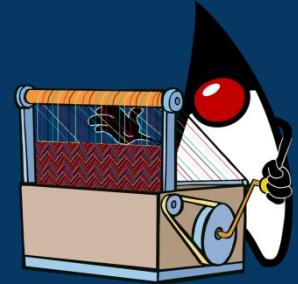
(for local models)

## WebGPU in js



Nico Martin

<https://maythe4thbewithyou.nico.dev>



Project Loom



**TORNADO VM**




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A futuristic tunnel with glowing blue rings and a central text overlay. The tunnel is composed of concentric, glowing blue rings that create a sense of depth and perspective. The rings are made of a dark material, possibly metal, and are illuminated from within, creating a bright blue glow. The perspective is from the center of the tunnel, looking down its length. The text "What new apps become possible?" is centered in the middle of the tunnel, overlaid on a black rectangular background.

**What new apps become  
possible?**

# User Experience



# Chatbot with tools

```
@RegisterAiService(tools = AllTools.class)
public interface FullShoppingAssistant {

    @SystemMessage("""
        You are Buzz, a helpful shopping assistant, from webshop 'Bizarre Bazaar'.
        You help customers finding products and placing orders.
        Always be polite and provide concise responses.
        You walk the user through following steps, and set the state to the appropriate step when needed:
        0. New Session (starting point)
        1. Define desired products (ask what the user needs, check our product catalog via getProductList()
        In your answer you will explain why you proposed the one you picked.)
        2. Proposed products (Once you picked the products for the customer, call proposeProductSelection or
        asks if the user wants to order more products, if so, call proposeProductSelection with the entire list)
        3. Shopping cart (once it is clear the user doesn't want to add/remove anything from the proposed products)
        4. Order placed (you tell the user his order was placed successfully and call displayOrderSuccess())
        """)

    String answer(@MemoryId int memoryId, @UserMessage String userMessage);
}
```

<https://github.com/LizeRaes/shopping-assistant>



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# Formatting, Parsing, Generation, Analysis

## Feedback Analyzer for a Coding Workshop

Age

34

Gender

Female

Country

Switzerland

Free Feedback

Super interesting examples. The room was a bit chilly though.

Submit

## Analysis Component

**Feedback Type:** PositiveFeedback

**Urgency:** 0%

**Severity:** 0%

**Impact:** 100%

**Feedback:** Super interesting examples!

**Category:** Examples

**Feedback Type:** Problem

**Urgency:** 20%

**Severity:** 10%

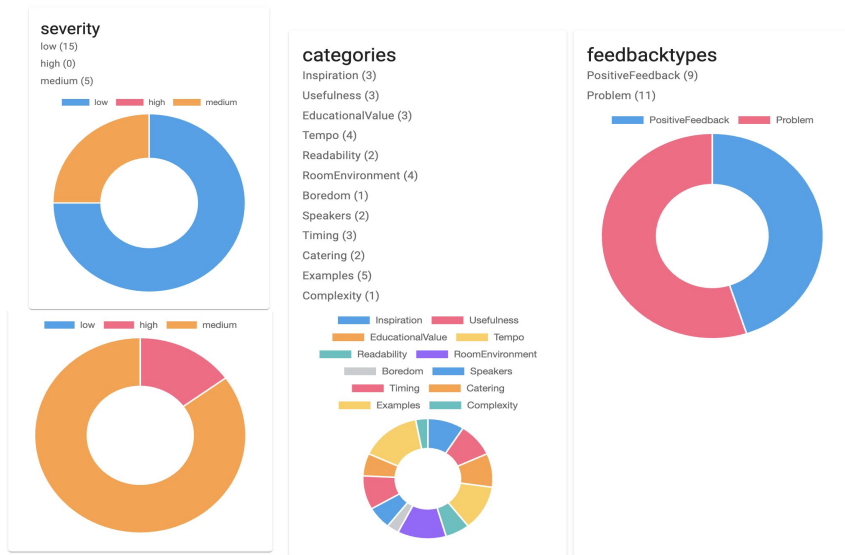
**Impact:** 100%

**Feedback:** The room was a bit chilly though.

**Category:** RoomEnvironment



# Formatting, Parsing, Generation, Analysis



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[github.com/langchain4j/langchain4j](https://github.com/langchain4j/langchain4j)

👉 Tutorial

## Chat analysis

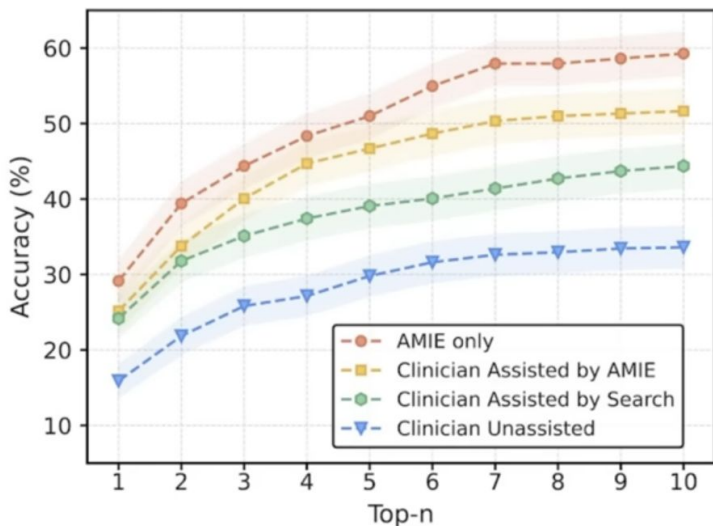
[User]: What did the women find about the food?

[AI Assistant]: The women found the food to be horrible, as it tasted like cardboard.

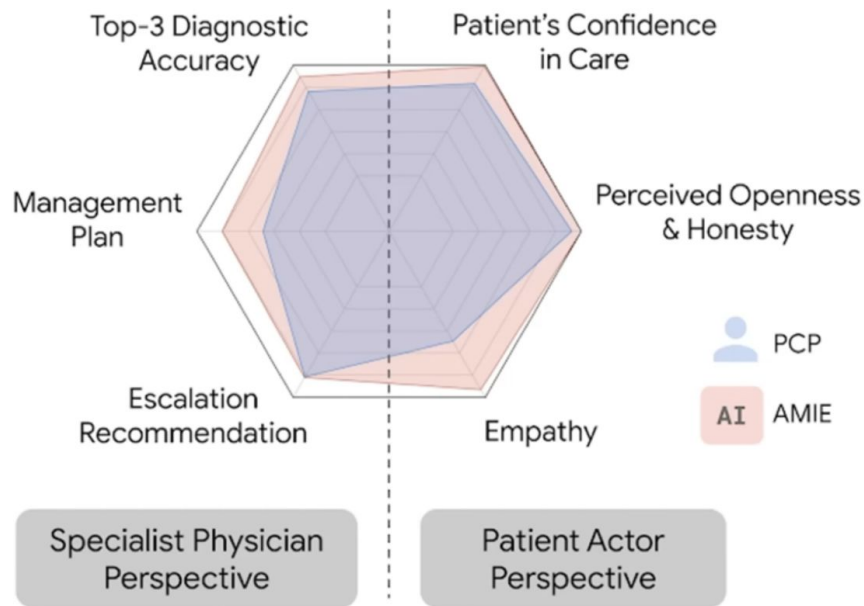
SEND The WebSocket is currently Open

[github.com/LizeRaes/feedback-analyzer](https://github.com/LizeRaes/feedback-analyzer)

# AMIE: A research AI system for diagnostic medical reasoning and conversations

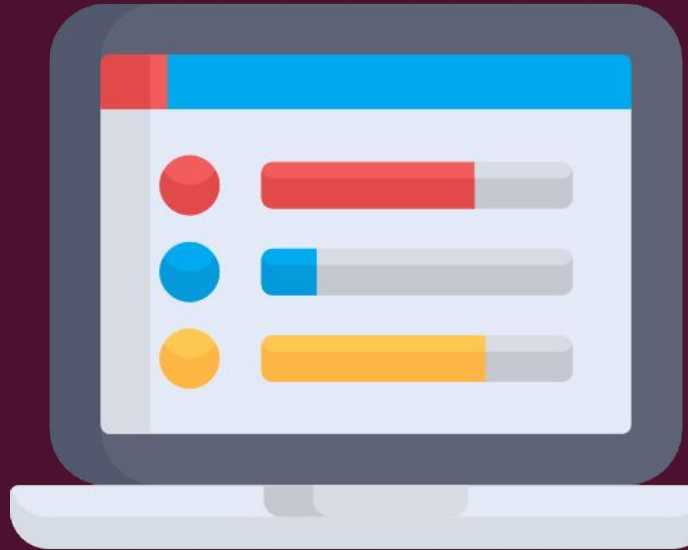


In addition to strong standalone performance, using the AMIE system led to significant assistive effect and improvements in diagnostic accuracy of the clinicians in solving these complex case challenges.



# What would you like to use AI for?

Let us know at [livecloud.online/join/TQAS](https://livecloud.online/join/TQAS)





A futuristic tunnel with glowing blue rings and a central text overlay. The tunnel is composed of concentric, circular rings that create a strong sense of depth and perspective, leading the eye towards a vanishing point in the distance. The rings are illuminated from within, casting a vibrant blue glow that contrasts with the dark, shadowed interior of the tunnel. The overall aesthetic is clean, modern, and high-tech, evoking a sense of advanced technology and exploration.

# Future Outlook

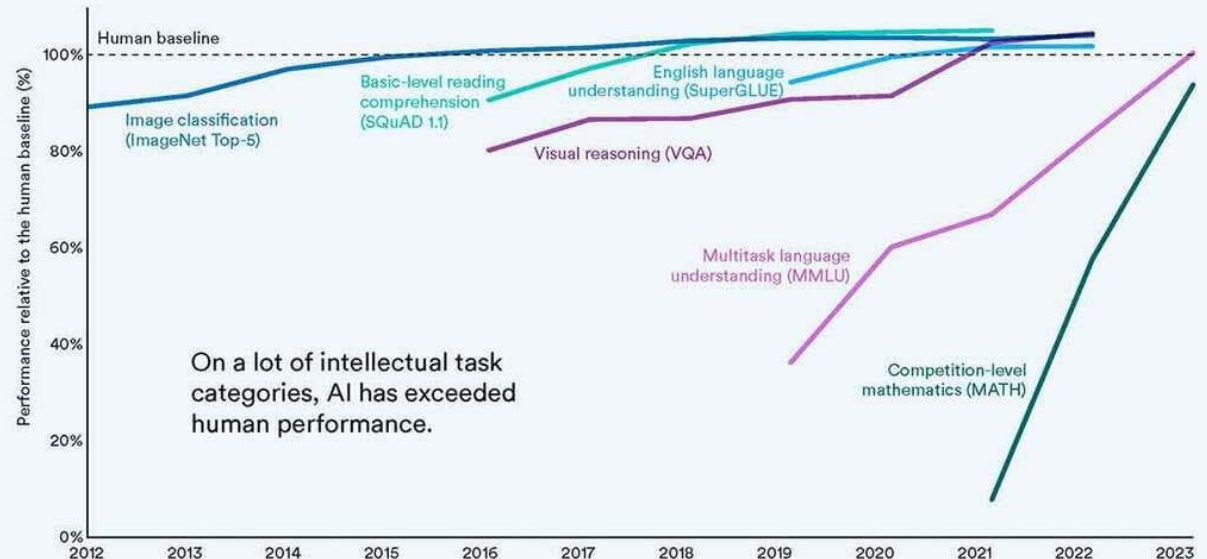
# Trends in models and tools

Source: Stanford University

- ✓ Higher quality
- ✓ Size and cost are dropping
- ✓ Less hallucinations
- ✓ Dedicated models
- ✓ On-device

## Select AI Index technical performance benchmarks vs. human performance

Source: AI Index, 2024 | Chart: 2024 AI Index report



On a lot of intellectual task categories, AI has exceeded human performance.

“As quickly as things are moving, each year is likely going to be magnitudes crazier — whether the world is ready or not.”



**Kent Beck** 🌻 ✓

@KentBeck



I've been reluctant to try ChatGPT. Today I got over that reluctance. Now I understand why I was reluctant.

The value of 90% of my skills just dropped to \$0. The leverage for the remaining 10% went up 1000x. I need to recalibrate.

12:51 PM · Apr 18, 2023 · **945.6K** Views



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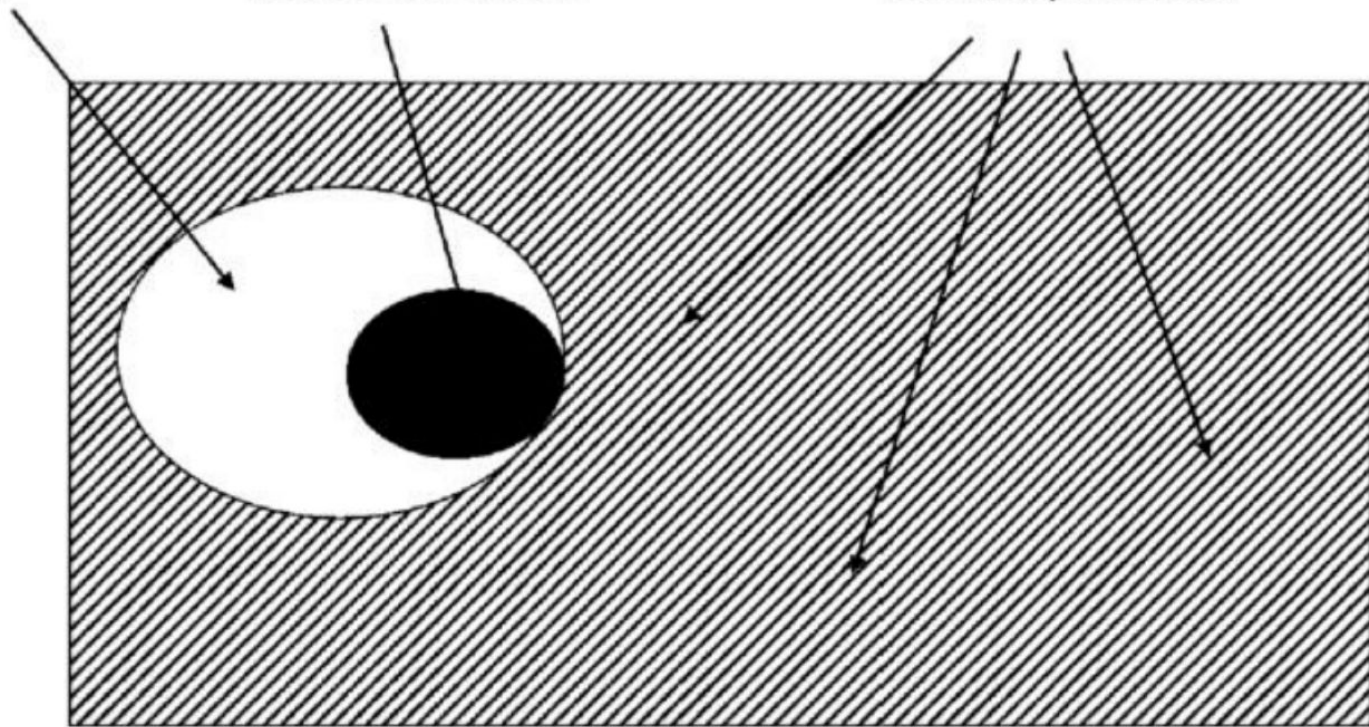
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# Will AI take our job?

Tasks that humans can do

Human tasks that machines could automate

New tasks that humans can do with the help of machines



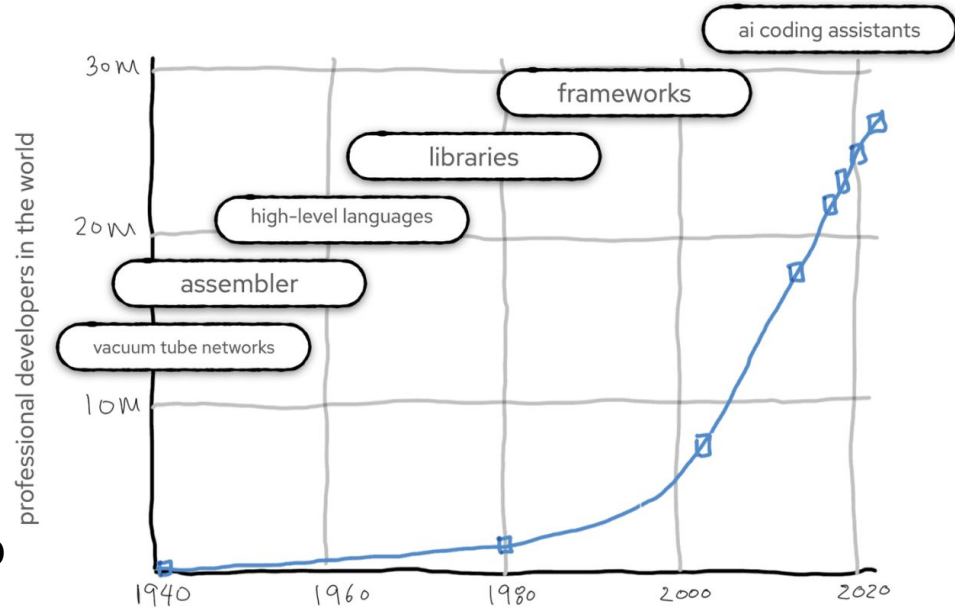
Brynjolfsson (2023)

# Will AI take our job?



Holly Cummins

“Then, after we’ve written (or copy-pasted) the code, our job is to get code from the internet all the way into production, debug the code, debug the code again, understand the computer’s deepest secrets, try and stop the computer system from going completely mad, work with colleagues to integrate incompatible systems, manage stakeholders, debug the code again since it’s doing something in production which no one has seen before, and then re-define the problem again.”



[hollycummins.com/will-ai-take-our-jobs](https://hollycummins.com/will-ai-take-our-jobs)



# Build what you love, love what you build

and help shaping the world you'd like to see



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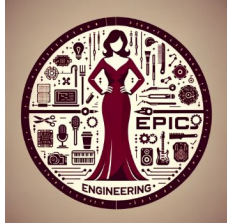
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# Let's be in touch!



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**EPIC ENGINEERING**

Personal blog

[www.epic.engineering](http://www.epic.engineering)



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**LangChain4j**

[github.com/langchain4j/langchain4j](https://github.com/langchain4j/langchain4j)