Tutorial V.I - Programming with AI

Programming: Everyday Decision-Making Algorithms

Dr. Tobias Vlćek
Kühne Logistics University Hamburg - Winter 2024

Using AI

Using AI to generate code
- Coding by hand is not the only way to generate code
- Most likely, a lot of you have already used ChatGPT

. . .

Large Language Models

How do

Large Language

Models work?

Photo by Taylor Vick on Unsplash

Large Language Models (LLMs)
- Think of them like advanced pattern recognition systems
- They have "read" massive amounts of text
- Books, websites, articles, code, and more
- Text is broken into tokens, parts of words or punctuation
- Based on patterns, they can generate new text

Training LLMs
- Imagine learning a language by reading millions of books
- Learns patterns in how words and ideas connect via tokens
- Interconnected nodes with weights representing patterns
- During training, these weights are adjusted
- Once trained, applying them takes much less ressources

Pattern Recognition
- Not like a search engine!
- When asked, it looks for relevant patterns it learned
- Like having a huge library in its "memory" to draw from
- It can find patterns between concepts and your question
- Knows only limited text at once (context window)

Probability based responses

- After each token, it predicts "what should come next?"
- Like a advanced word prediction on your phone
- Chooses the most likely next token based on training
- Uses randomness to generate different responses
- But can't actually "think" or "understand" like humans

Limitations

- No true understanding of cause and effect
- Sometimes makes mistakes or "hallucinates"
- Mostly only knows what it was trained on
- Can reflect biases present in training data
- No emotional understanding (but can simulate responses!)

Impact on Jobs

- Question: What do you think about their impact on jobs?
- Question: What are the implications for us?
- Question: Can we use them to our advantage?

Code Generation Tools

(Current) Choices for Programmers

- Github Copilot: Integrated into VS Code by Microsoft
- Cursor: Fork of VS Code with AI assistance built in
- Aider: Chat interface for AI to write code in the terminal

. . .

> 💡 Tip
>
> Currently, Cursor is my favorite one. But this might change in the future, as there is a lot of competition in this space.

Installing Cursor

- Go to Cursor
- Download and install Cursor
- You will need to create an account
- Some free usage per month, after that you need to pay
- For us, the free plan should be more than enough

Using Cursor

- Open the folder with your tutorial files
- Instead of notebooks, we will use `.py` files
- Create a new `.py` file
- Press `Ctrl + L` to open the chat

Asking for help

Task: Paste the following prompt in to the chat:

Can you please write me a small random number guessing game in python? It should work for one player in the terminal. The player should guess a number between 1-10 and get hints about whether his guess was too large or too small. After 3 tries, end the game if he didn't succeed with a nice message.

. . .

Copy the generated code and paste it into your file.

More on Cursor

- While working with Cursor, it will suggest you code changes
- You can accept or reject them
- The rest you will learn by doing!

. . .

> ℹ Note
>
> And that's it for the introduction to AI!
> You now have the basic knowledge to start working with AI!.