

Prof. Dr. Boas Pucker

# Python - Artificial Intelligence

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## Availability of slides

- All materials are freely available (CC BY) - after the lectures:
  - GitHub: <https://github.com/bpucker/teaching/tree/master/WBIO-A-07>
- Questions: Feel free to ask at any time
- Feedback, comments, or questions: [pucker\[a\]uni-bonn.de](mailto:pucker[a]uni-bonn.de)



















































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# Introduction to Artificial Intelligence (AI)

- “simulation of human intelligence processes by machines, especially computer systems”
- Examples: Google searches, Netflix recommendations, self driving cars, ChatGPT3
- AI envisioned in 1956, but only took off after 2017
- LLM = Large Language Models

# AI options

THE ULTIMATE AI TOOL CHEAT SHEET			
LLM / TEXT	IMAGES	VIDEOS	AUDIO
 ChatGPT	 Midjourney	 Runway	 Murf
 Claude	 DALL-E 3	 Pictory	 Eleven Labs
 Bing Chat	 Leonardo	 Veed	 Otter
 Google Bard	 Firefly	 HeyGen	 Speechify
CHATBOT	MARKETING	PRESENTATIONS	DESIGN
 Dante AI	 AdCreative	 Tome	 Canva
 Air	 Claude	 Simplified	 Adobe Firefly
 ChatSimple	 Jasper	 Beautiful.ai	 Designs.ai
 Zapier	 SEMrush	 Synthesia	 Makker
SOCIAL MEDIA	RESEARCH	COPYWRITING	PRODUCTIVITY
 Sprout Social	 HARPA	 Copy.ai	 ChatGPT Plus
 Emplifi	 Perplexity	 Grammarly	 Taskade
 Lately	 Glasp	 Wordtune	 Audio Pen
 Brandwatch	 ChatGPT Plus	 WriteSonic	 Notion AI

# Introduction to AI-Generated Code

- Definition: AI-powered tools and techniques for code generation.
- Significance: Transforming software development, automating repetitive tasks, enhancing productivity.
- Impact: Revolutionizing coding practices, enabling new possibilities in software engineering.

# AI for Code Translation and Refactoring

- **Translation Between Script/Programming Languages:**
  - Applications: Porting projects, integrating libraries, interoperability.
- **Refactoring Tools:**
  - Features: suggesting improvements, optimizing performance.
  - Challenges: Maintaining functionality, preserving code quality, handling edge cases.

# Code Generation with Generative Models

- **Generative Models:**
  - Definition: Models capable of generating new data samples.
  - Applications: Generating code snippets, functions, scripts.
- **Considerations:**
  - Ethical Implications: Ensuring code quality, security vulnerabilities.
  - Practical Challenges: Handling code complexity, maintaining readability.

# Ethical and Practical Considerations

- **Risks & Limitations:**

- Quality Assurance: Importance of human oversight, code reviews.
- Security Concerns: Identifying and mitigating vulnerabilities, ensuring data privacy.

- **Best Practices:**

- Responsible Use: Understanding AI limitations, continuous monitoring.
- Collaboration: Balancing AI automation with human expertise, fostering teamwork.





You

How to generate a plot in python that visualizes a list of values?



ChatGPT

To generate a plot in Python that visualizes a list of values, the most commonly used library is `matplotlib`. Here's a step-by-step guide on how to do it:

## 1. Install Matplotlib (if you haven't already):

bash

Copy code

```
pip install matplotlib
```

## 2. Generate a Simple Plot:

Here's a basic example to plot a list of values.

python

Copy code

```
import matplotlib.pyplot as plt

# Sample data
values = [1, 2, 3, 4, 5]

# Create a plot
plt.plot(values)

# Show the plot
plt.show()
```

## 3. Customize the Plot:

You can customize various aspects of the plot like adding titles, labels, changing colors, line styles, etc.

python

Copy code

```
import matplotlib.pyplot as plt

# Sample data
values = [1, 2, 3, 4, 5]
labels = ['A', 'B', 'C', 'D', 'E']

# Create a plot
plt.plot(labels, values, marker='o', linestyle='--', color='g', label=

# Add titles and labels
plt.title('Sample Plot')
plt.xlabel('Categories')
plt.ylabel('Values')

# Show legend
plt.legend()

# Show the plot
plt.show()
```

## ChatGPT limitations

- V3 refuses to report scientific publications (used to make them up)
  - V4 is able to provide accurate references
- V3 refuses to report sequences
- Quality depends on input data and knowledge is outdated
- ChatGPT3.5 performs above average human performance in many cases
- ChatGPT4 was trained on AI generated code; potentially lower performance

## Bing Chat

- Provides summary of search results
- Requires Microsoft Edge as web browser

## Exercises

- Repeat the exercises of all previous parts with AI support
- Take notes about interesting observations
- Is the AI solution better than your own solution?
- What are the advantages of using an AI?
- Are there disadvantages of the AI solution?

# Time for questions!