

Integration of Artificial Intelligence in Education and Software Development

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Introduction

- **Presenter:** Luna Schätzle – Project Lead (AI evaluation, backend & website)
- **Objective:** Open-source AI platform for education
- **Focus:** Evaluate various AI models for multiple use cases
- **Platform:** Enable students to access and experiment with AI
- **Motivation:** Overcome high resource requirements of current Open Source AI models



Open Source: Impact & Approach

- **Definition:** Public, collaborative development
- **Benefits:** Cost-efficient, flexible, secure via community review
- **Impact:** Fuels innovation and startup growth
- **Our Approach:** Leveraging Python, Flask, Vue.js
- **Our Application:** Open-source licensed under GNU GPL-3.0



Testing and Evaluation

- Evaluation of models: Llama3.2, Deepseek-r1, gemma2, qwen, ...
- Testing methods: Different prompts and tasks where asked the models (automated via Python script)
- Evaluation criteria:
 - response time
 - accuracy
 - resource usage
 - BLEU score
 - readability
 - Textquality



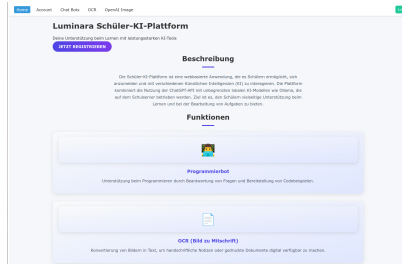
Evaluation Results

- **Data Preparation:** Graphical analysis was conducted to elucidate patterns.
- **Model Performance:**
 - Marked differences in response time, accuracy, and resource consumption.
 - Smaller models demonstrated superior efficiency.
- **User Integration:**
 - A diverse array of models is available for selection.
 - The top-performing model is auto-recommended.
- **Key Insight:** Model size does not reliably predict quality; balanced assessments are imperative.



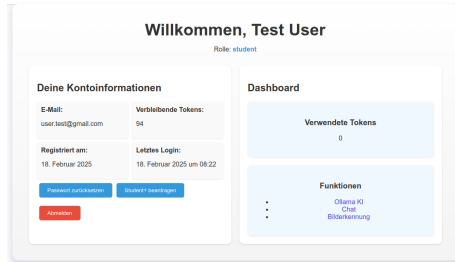
Website Platform

- Developed to make AI accessible to students.
- Built with:
 - Vue.js (Frontend)
 - Flask (Backend API)
 - Firebase (User data & authentication)
- Purpose: Central interface for interacting with various AI tools.



User System

- Registration and secure login
- Profile management
- Firebase-based authentication



Chatbot Interface

- Multiple AI models available via tabs:
 - ChatGPT (OpenAI API)
 - Local models (e.g., Ollama)
 - Programming Assistant
- Vision models: LLaVA, LLaMA 3.2 Vision

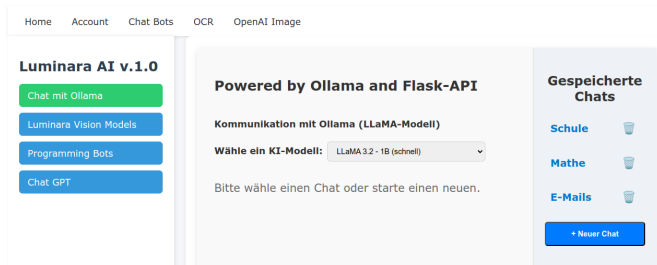
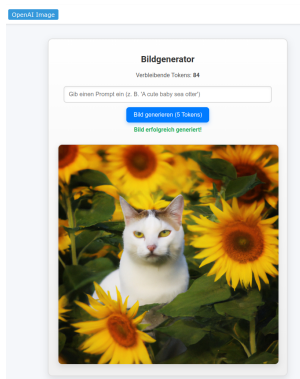


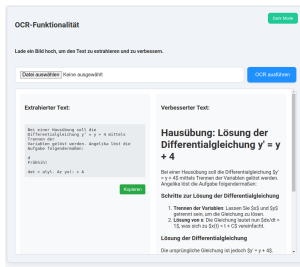
Image Generation

- Generate images from text prompts
- Uses DALL·E (OpenAI)



OCR and Image Recognition

- OCR with Tesseract
- Post-processing using a large language model
- Leverages Markdown for formatting



AI in Economics and Ethics

Applications:

- Customer service & support
- Supply chain management
- Predictive analytics
- Data analysis
- Process automation



Ethical & Social Concerns:


- Bias in training data
- Transparency & accountability
- Privacy and data protection
- Impact on the workflow and job displacements



Regulatory Challenges:

- Data security standards (e.g., GDPR [EUR-Lex: 2016/679])
- EU AI Act considerations [EUR-Lex: 2024/1689]
- Inconsistent global regulations



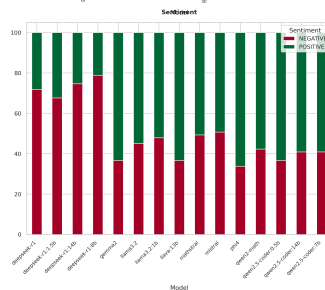
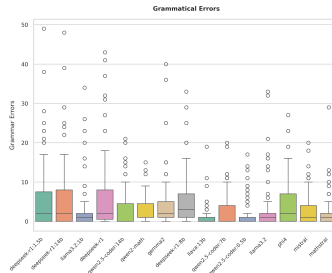
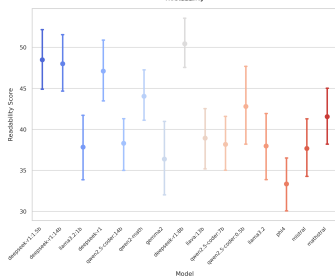
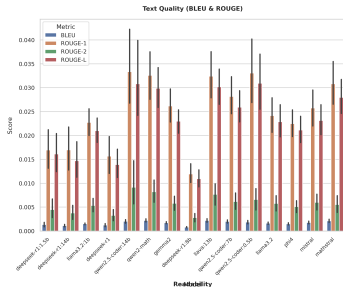
A decorative graphic consisting of a central diamond shape formed by several smaller, overlapping diamonds in various colors: pink, green, orange, grey, yellow, and light blue. The diamonds are arranged in a symmetrical, geometric pattern.

Thank You for Your Attention!



Backup slides Graphics

Evaluation Results: Qualitative metrics



Evaluation Results: Quantitative metrics

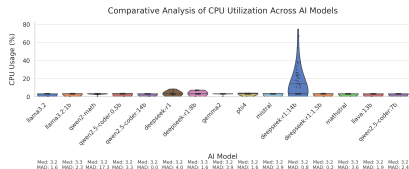


Figure: CPU Usage Comparison

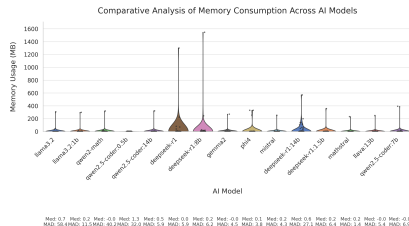


Figure: Memory Usage Comparison



- **Server Hardware:**

- CPU: Intel Core i5.8600k
- GPU: NVIDIA GeForce RTX 2060
- RAM: 16GB DDR4
- Motherboard: H370 Chipset
- Power Supply: 500W BeQuiet
- Storage: 512GB NVMe SSD

- **Used Operating System:** The Server is running with the Ubuntu Server Operating System. The Operating System has been chosen due to the good cuda support.



- **Networking:**

- Axios: Used for server requests
- Tailscale: VPN tunnel used for secure remote access

- **Backup and Recovery:** Regular system backups have been made to avoid data loss.



Flask Service

- Flask as a Web Framework
- Architecture and Service Structure
- Restful Endpoints and Functionalities
- Deployment with Docker



Visual Studio Code Extension


- VS Code API / Typescript
- Server Request
- Integrated Chatbot
- Status Bar Item



Operating System Market Share

- **Competitors:** Android, Microsoft Windows, Apple and Linux hold most of the market.
- Bild
- **For Servers:** When looking at Server Operating Systems specifically The main Competitors are Red Hat and Microsoft.
- Bild



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