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

Project Team and Management

- **Team Members:** Luna Schätzle, Florian Prandstetter
- **Project Coordination:** Regular meetings, discussions, and planning sessions
- **Tools Employed:**
  - GitHub for version control and collaborative coding
  - Discord for communication and coordination
  - Google Sheets for time tracking
  - LaTeX for comprehensive documentation

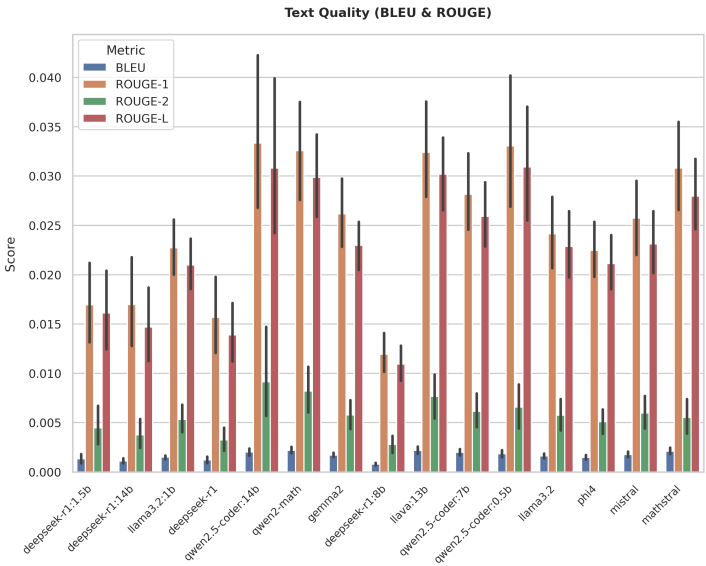
Theoretical Background

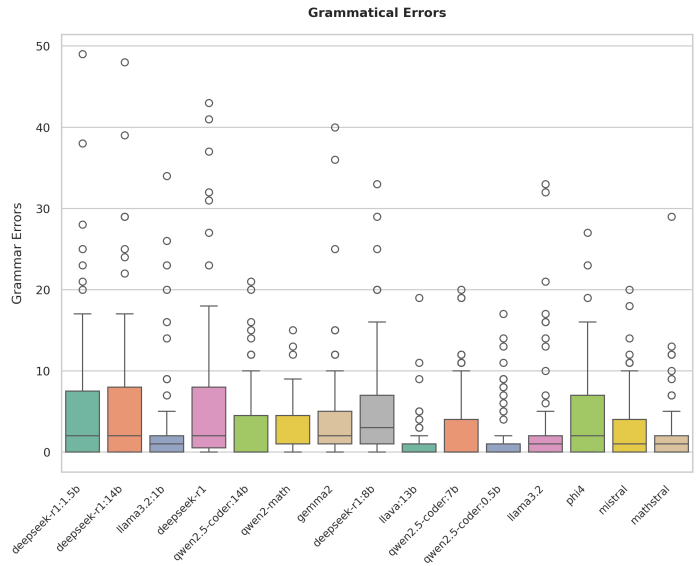
- **LLMs Integration:** Evaluation and incorporation of various Large Language Models.
- **Interfaces:** API connections, local models (e.g., Ollama), and OpenAI API.
- **Evaluation:** Systematic testing of open source models

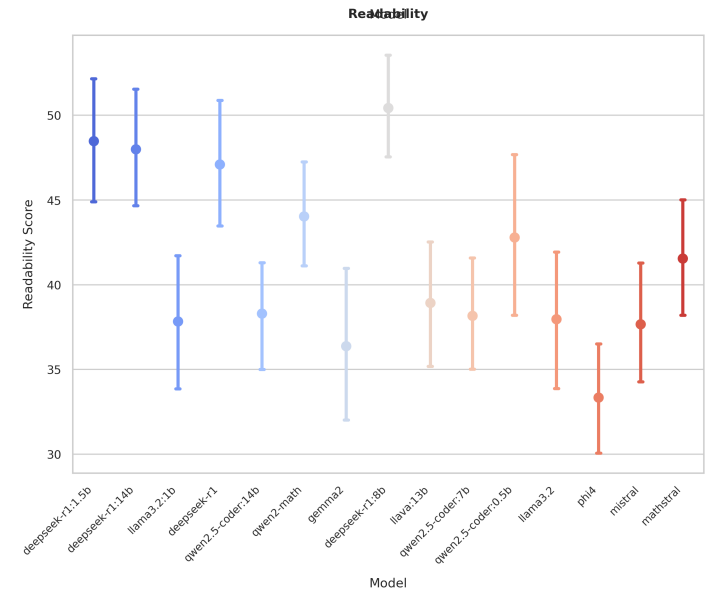
Testing and Evaluation

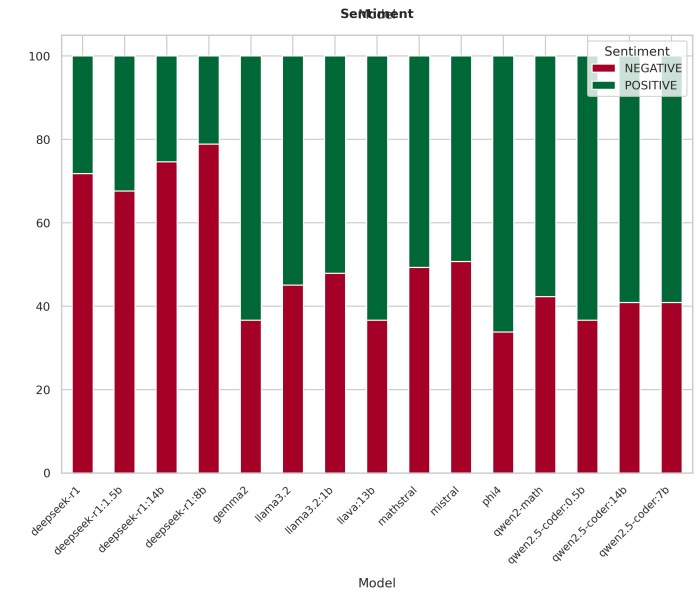
- Evaluation of models: Llama3.2, Deepseek-r1, gemma2, qwen, ...
- Testing methods: Different prompts and tasks where asked the models (automated via Python script)
- Evaluation criteria:
  - response time
  - accuracy
  - resource usage
  - BLEU score
  - readability
  - Textquality

Evaluation Results: Quantitative metrics









Evaluation Results: Qualitative metrics

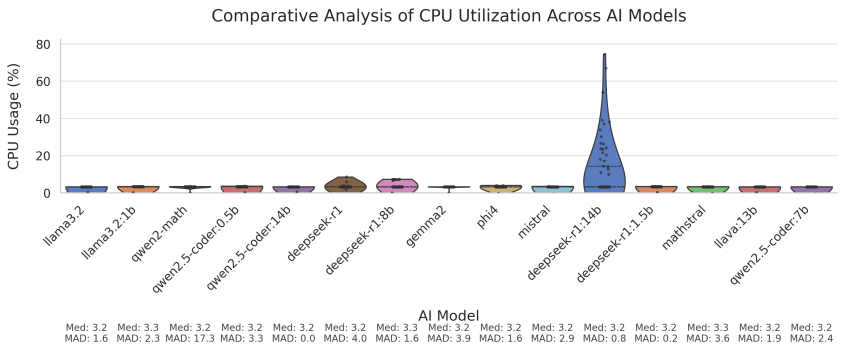


Figure: CPU Usage Comparison

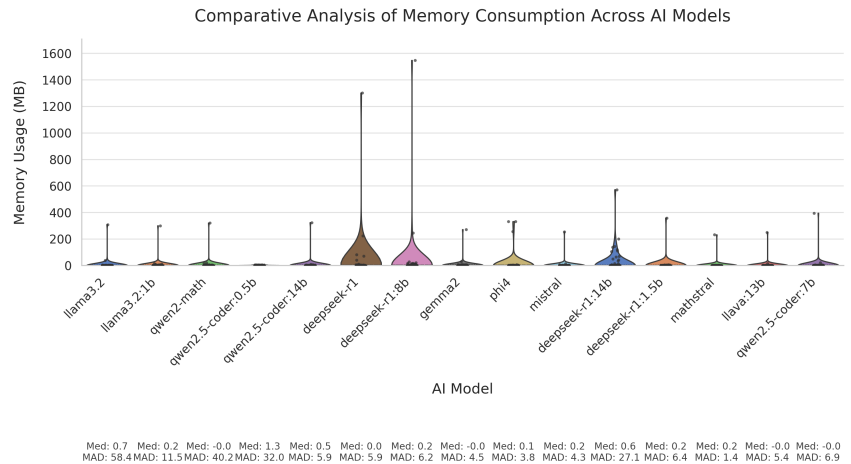


Figure: Memory Usage Comparison

Website Platform

- To realise the vision of the project, we created a website platform.
- The website was realised thru the use of Vue.js and Flask (Backend API) and Firebase (Database).
- The website has the following features (as of the presentation date):
  - User registration, login and profile management
  - Chatbot interface a various AI models (thrue API general local models, Programming Assistant, Chat with chat GPT, image regocnition via LLaVA and Llama3.2-vision)
  - Image generation with DallE
  - OCR (Optical Character Recognition) with Tesseract and enhanced via LLama3.2

AI in Economics and Ethics

Applications:

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

AI in Economics and Ethics

Ethical & Social Concerns:

- Bias in training data
- Transparency & accountability
- Privacy and data protection
- Impact on employment

AI in Economics and Ethics

Regulatory Challenges:

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

Open Source Overview

- **Definition:** Collaborative, transparent development with public source code.
- **Advantages:** Cost efficiency, flexibility, improved security through peer review, high compatibility.
- **Economic Impact:**
  - Drives innovation & cross-industry collaboration
  - Empowers startups and lowers entry barriers

Challenges and Revenue Models

- **Challenges:** Fragmentation, limited support, licensing complexities, security risks.
- **Revenue Models:** Open core, managed services, support contracts, donations, dual licensing.
- **Our Approach:** Utilize open source tools (e.g., Python, Flask, Vue.js) under GNU GPL-3.0 for transparency and collaboration.

Conclusion

- Summary of achievements
- Insights gained during the development
- Future potential of the system
- Final thoughts and acknowledgments

Florian