

Integration of Artificial Intelligence in Education and Software Development

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Diploma Thesis Defense – April 2025

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Introduction

- **Presenter:** Luna Schätzle
- **Objective:** Enable student access to open-source AI tools
- **Focus:** Evaluate and integrate diverse AI models for different usecases



Open Source: Impact & Approach

- **Definition:** Public, collaborative development
- **Benefits:** Cost-efficient, flexible, and secure via community review
- **Impact:** Fuels innovation and startup growth
- **Approach:** Leverage Python, Flask, and Vue.js
- **Licensing:** Released under GNU GPL-3.0



Testing and Evaluation

- **Models Evaluated:** Llama3.2, Deepseek-r1, Gemma2, Qwen, etc.
- **Methods:** Automated testing with varied prompts via Python scripts.
- **Criteria:**
 - Response time
 - Resource utilization
 - Accuracy
 - Readability and text quality



Evaluation Results

- **Visualization:** Plots reveal key model discrepancies
- **Performance:** Slight variations in latency, and resource use
- **Efficiency:** Smaller models often outperform larger ones
- **Insight:** Model size alone does not predict quality
- **Integration:** User-driven selection with best-model recommendation



Website: Education Platform

- Serves as a centralized portal for accessing various AI tools.
- Technologies: Vue.js (Frontend), Flask (Backend API), and Firebase (Authentication).

The screenshot shows a web application interface titled "Luminara Schüler-KI-Plattform". At the top, there are navigation links: "Accueil", "Chat Beta", "OCR", and "OpenAI Image". Below the title, a button says "JETZT PROBOSTRIESEN". A section titled "Beschreibung" (Description) contains text about the platform's purpose: "Die Schüler-KI-Plattform ist eine webbasierte Anwendung, die es Schülern ermöglicht, sich anhand von unterschiedlichen künstlichen Intelligenzen (KI) zu interagieren. Die Plattform kombiniert die Nutzung der ChatGPT API mit weiteren lokalen KI-Modellen wie Olmeca, die auf dem Schülereigenen Gedanken basieren. Ziel ist es, den Schülern vielseitige Unterstützung beim Lernen und bei der Bearbeitung von Aufgaben zu bieten." Below this, a section titled "Funktionen" (Features) lists two main tools: "Programmierwerk" (Programming tool) and "OCR (Bild zu MischtextR)" (Optical Character Recognition). Each feature has a small icon and a brief description.



User System

- Secure registration and login.
- Firebase-based authentication.
- User Dashboard

Willkommen, Test User
Role: student

E-Mail:	Verbleibende Tokens:
user.test@gmail.com	94
Registriert am:	Letztes Login:
18. Februar 2025	18. Februar 2025 um 09:22

[Passwort zurücksetzen](#) [Student hinzufügen](#)

[Abmelden](#)

Dashboard

Verwendete Tokens: 0

Funktionen

- [Olafers KI](#)
- [Chat](#)
- [Bilderkennung](#)



Chatbot Interface

- Multiple AI models available via a tabbed interface:
 - Evaluated models (e.g. Llama3.2, ...)
 - Vision capabilities: LLaVA, LLaMA 3.2 Vision.
 - Programming Assistant
 - ChatGPT (OpenAI API)

The screenshot shows the Luminara AI v.1.0 interface. At the top, there is a navigation bar with links: Home, Account, Chat Bots, OCR, and OpenAI Image. Below this is a main content area with a sidebar on the right.

Luminara AI v.1.0

- Chat mit Ollama
- Luminara Vision Models
- Programming Bots
- Chat GPT

Powered by Ollama and Flask-API

Kommunikation mit Ollama (LLaMA-Modell)

Wähle ein KI-Modell: LLaMA 3.2 - 1B (schnell) ▾

Bitte wähle einen Chat oder starte einen neuen.

Gespeicherte Chats

- Schule
- Mathe
- E-Mails

+ Neuer Chat



Image Generation

- Generate images from text prompts.
- Powered by DALL · E (OpenAI).

OpenAI Image

Bildgenerator
Verbleibende Token: 84

Gib einen Prompt ein (z. B. 'A cute baby sea otter')

Bild generieren (5 Token)

Bild erfolgreich generiert!



OCR - Optical Character Recognition

- OCR capabilities using Tesseract.
- Post-processing with a large language model.
- Outputs formatted using Markdown.

OCR-Funktionalität

Lade ein Bild hoch, um den Text zu extrahieren und zu verbessern.

Datei auswählen | Keine ausgewählt

OCR ausführen

Extrahierter Text:

Bei einer Hausübung soll die Differentialgleichung $y' = y + 4$ mittels Trennen der Variablen gelöst werden. Angelika lädt die Aufgabe folgendermaßen:

y'
Fraktion!
 $\frac{dy}{dx} = \frac{y+4}{x}$ $\Rightarrow y = \dots$

Kopieren

Verbesserter Text:

Hausübung: Lösung der Differentialgleichung $y' = y + 4$

Bei einer Hausübung soll die Differentialgleichung $y' = y + 4$ mittels Trennen der Variablen gelöst werden. Angelika lädt die Aufgabe folgendermaßen:

y'
Fraktion!
 $\frac{dy}{dx} = \frac{y+4}{x}$ $\Rightarrow y = \dots$

Kopieren

Schritte zur Lösung der Differentialgleichung

1. Trennen der Variablen: Lassen Sie $S(y)$ und $S(x)$ getrennt sein, um die Gleichung zu lösen.
2. Lösung von x : Die Gleichung lautet nun $S(y)/S(x) = 15$, was sich zu $S(x) = 1 + Cx$ vereinfacht.

Lösung der Differentialgleichung

Die ursprüngliche Gleichung ist jedoch $By' = y + 4$.



Applications:

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



AI in Economics and Ethics: Regulatory Challenges

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





Thank You for Your Attention!



Backup slides: Graphes

Evaluation Results: Qualitative metrics

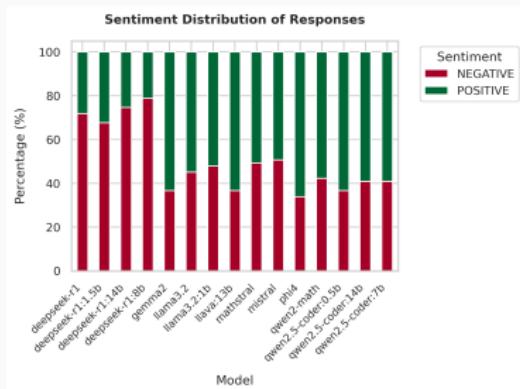
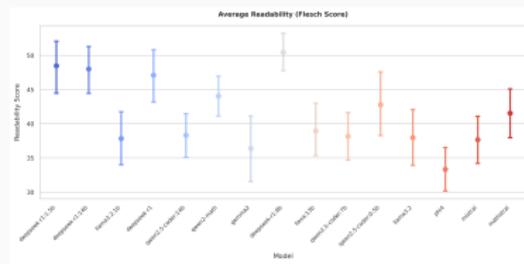
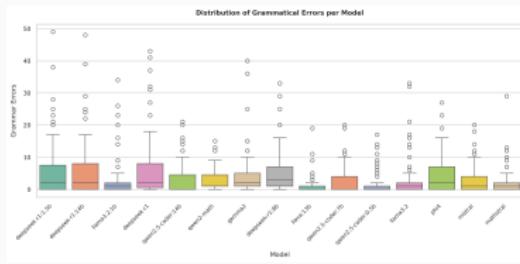
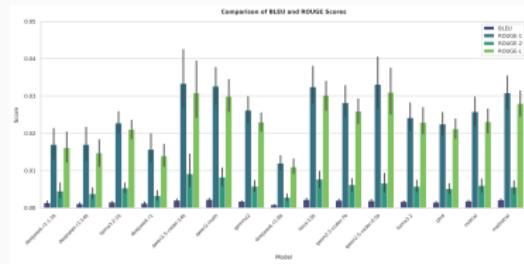


Figure 1: Evaluation Results of AI Models



Evaluation Results: Quantitative metrics

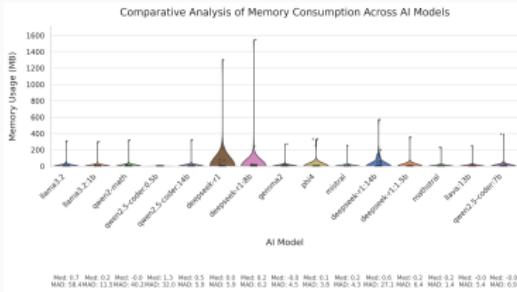
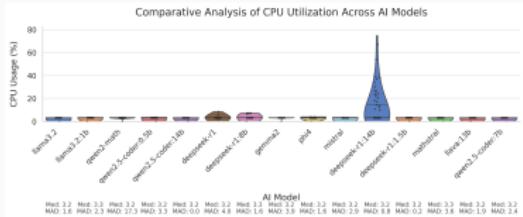
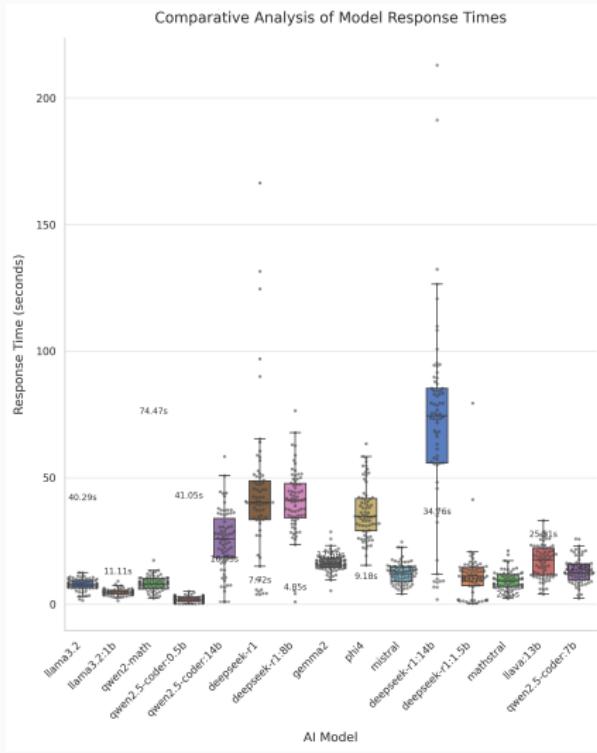


Figure 2: CPU Usage Comparison

Figure 3: Memory Usage Comparison



Figure 4: response time comparison of different models



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Introduction

- **Presenter:** Florian Prandstetter
- **Objective:** Server, VS Code Extension & Operating Systems
- **Focus:** Develop an open-source Extension for Visual Studio Code and a stable server environment



Server

- **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 SSDd
- **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.



Operating System

- **Used Operating System:**

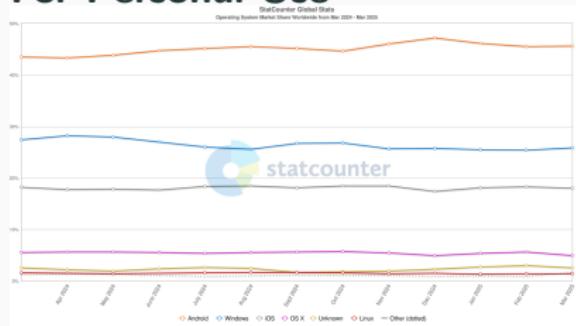
The Server is running with
the Ubuntu Server
Operating System.

- Good basis for AI models
- CUDA support



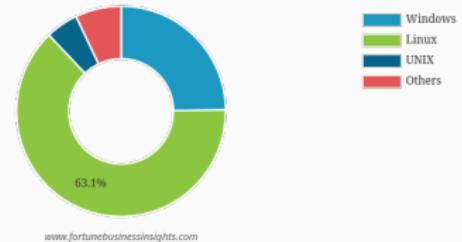
Operating System Market Share

For Personal Use



For Servers

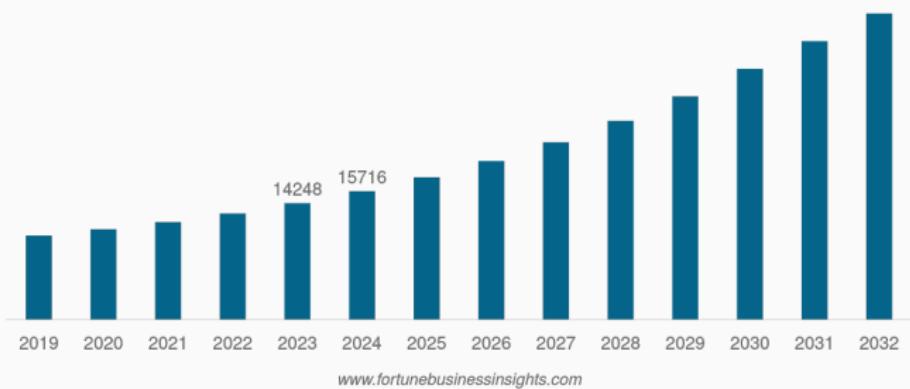
Global Server Operating System Market Share, By Operating System, 2024



Server Operating System Market Volume

- Global Market Share: America 59,56%
- CAGR: 12,4%
- Expected to double by 2032

Americas Server Operating System Market Volume, 2019-2032 (K Units)



www.fortunebusinessinsights.com

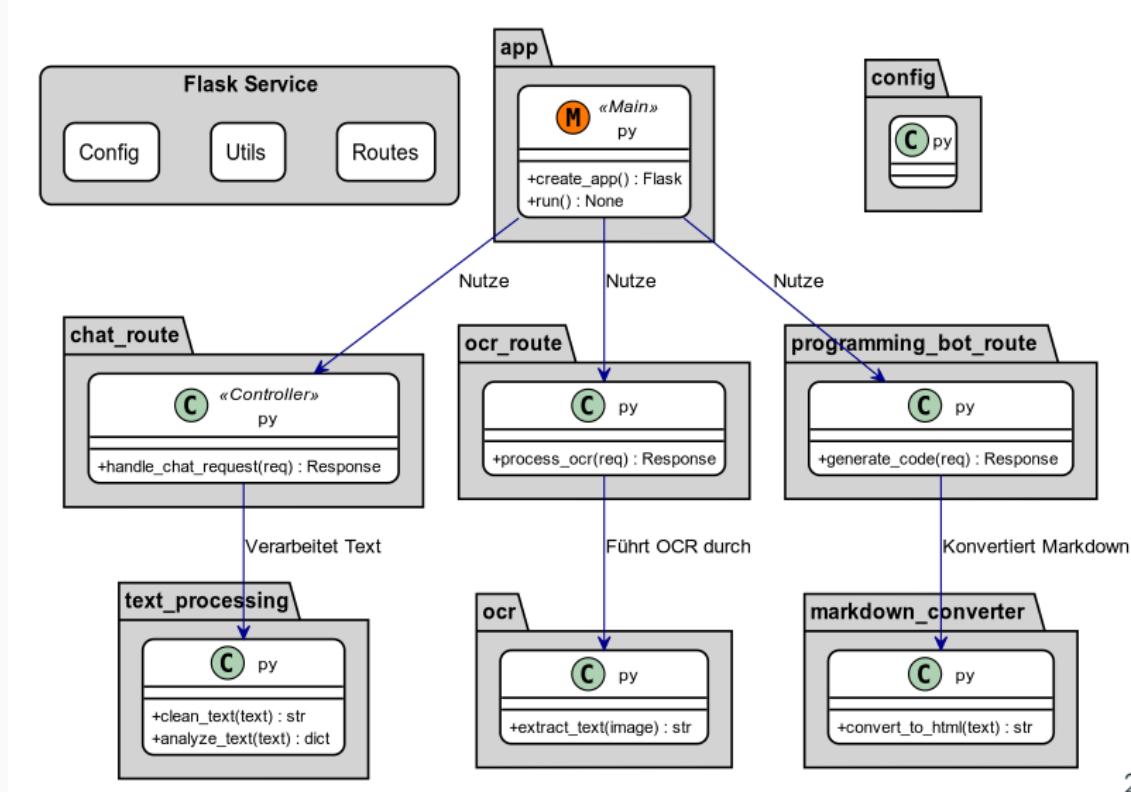


- **Restful Endpoints and Functionalities:**
 - Chatbot
 - Programming bot
 - Optical Character Recognition
- **Deployment with Docker:**
 - Dockerfile
 - Docker-Compose



Flask Service

- Architecture and Service Structure



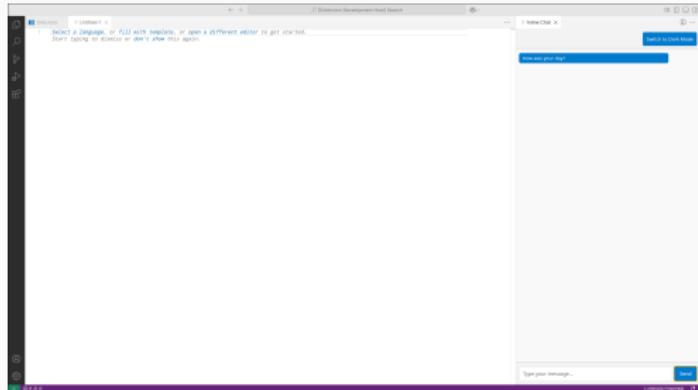
Visual Studio Code Extension

- **Integrated AI Chatbot**
- **Technologies:**
 - VS Code API
 - Type Script
- **Server Requests:** Are handled with Axios to create a stable connection.



Visual Studio Code Extension

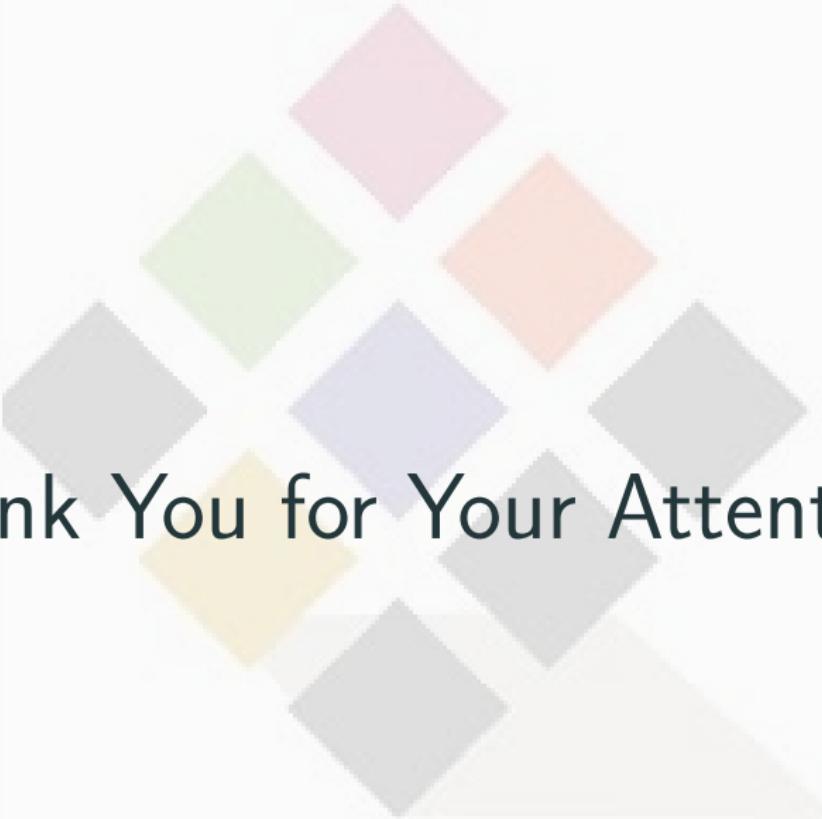
- Separate Chat-Window
- Output into file
- Adjustable Color Themes



Risks of AI & Ethical concerns

- Transparency and Data Protection
- Bias in training data
- Accountability
- Job displacement





Thank You for Your Attention!

A decorative background consisting of several overlapping squares of different colors and shades. The colors include light gray, medium gray, yellow, purple, orange, green, and pink. They are arranged in a staggered, overlapping pattern across the entire slide.

Backup slides: Graphes