

Integration of Artificial Intelligence in Education and Software Development

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Diploma Thesis Defense – April 2025

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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:**

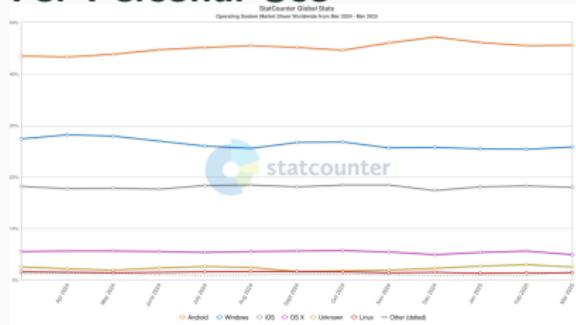
The Server is running with
the Ubuntu Server
Operating System.

- Good basis for AI models
- CUDA support



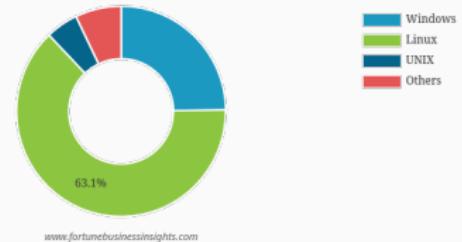
Operating System Market Share

For Personal Use



For Servers

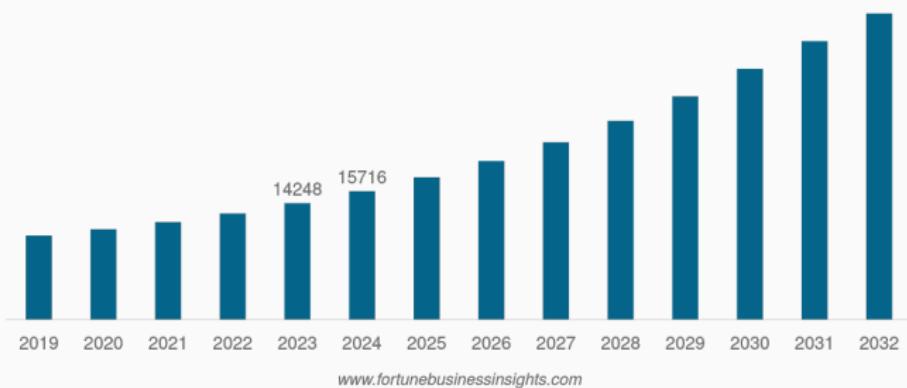
Global Server Operating System Market Share, By Operating System, 2024



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



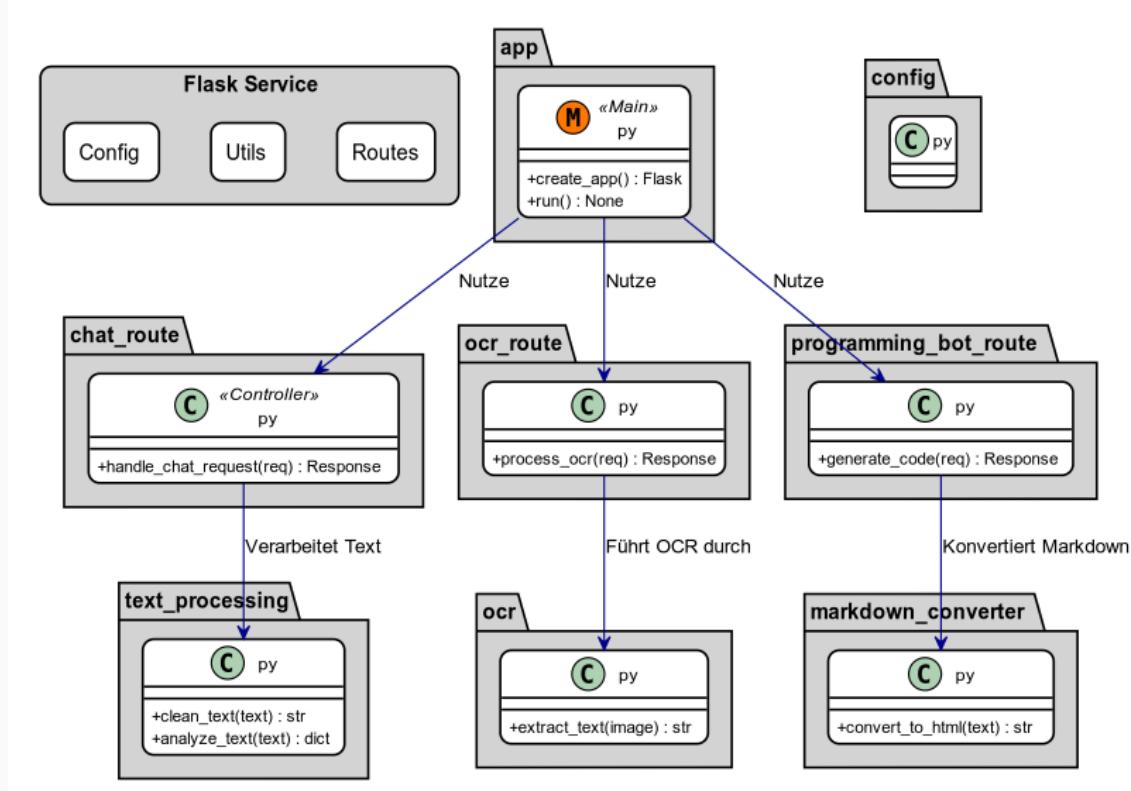
Flask Service

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



Flask Service

- Architecture and Service Structure



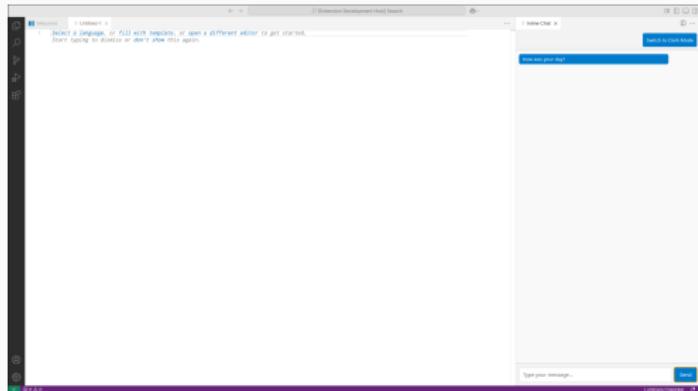
Visual Studio Code Extension

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



Visual Studio Code Extension

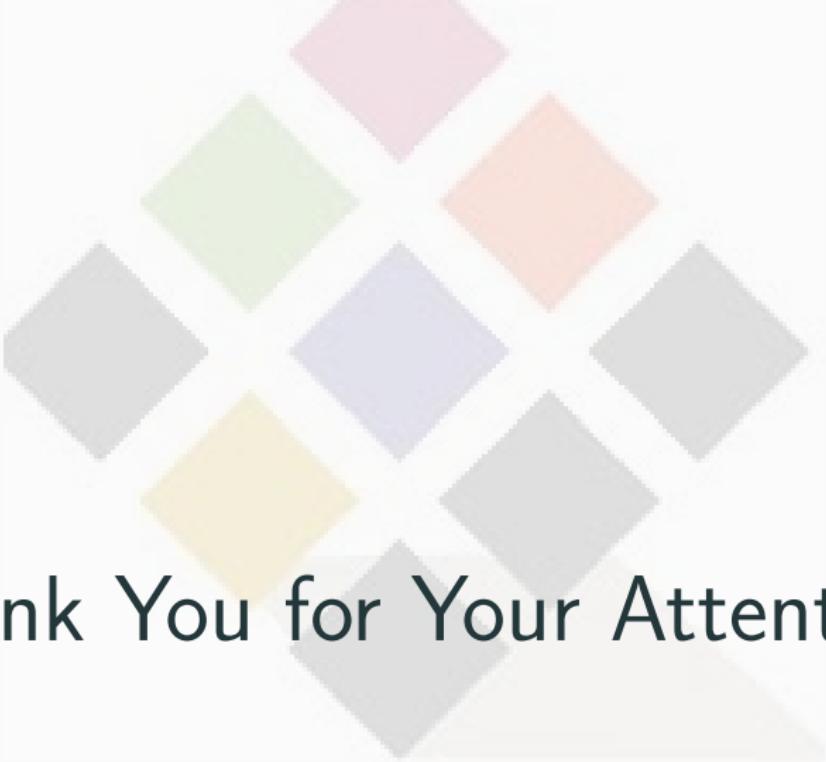
- Separate Chat-Window
- Output into file
- Adjustable Color Themes



Risks of AI & Ethical concerns

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





Thank You for Your Attention!

Backup slides: Graphes

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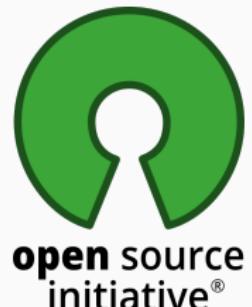
Introduction

- **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 the homepage of the "Luminara Schüler-KI-Plattform". At the top, there is a navigation bar with links for "Accueil", "Chat Beta", "OCR", and "OpenAI Image". Below the navigation bar, there is a large button labeled "JETZT PROBOSTRIESEN". The main section is titled "Beschreibung" and contains text about the platform's purpose: "Die Schüler-KI-Plattform ist eine webbasierte Anwendung, die es Schülern ermöglicht, sich anhand von und mit verschiedenen künstlichen Intelligenzen (KI) zu interagieren. Die Plattform kombiniert die Nutzung der ChatGPT API mit unterschiedlichen lokalen KI-Modellen wie Olmeca, die auf dem Schülerverfahren beruhen. Ziel ist es, den Schülern vielseitige Unterstützung beim Lernen und bei der Bearbeitung von Aufgaben zu bieten." Below this, there are two sections: "Funktionen" and "Programmieren". The "Programmieren" section includes a sub-section for "OCR (Bild zu Mischtext)", which is described as "Konvertierung von Bildern in Text, um handschriftliche Notizen oder gezeichnete Dokumente digital verfügbar zu machen." There are also icons for "Programmieren" and "OCR".



User System

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

Willkommen, Test User
Role: student

Deine Kontoinformationen

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

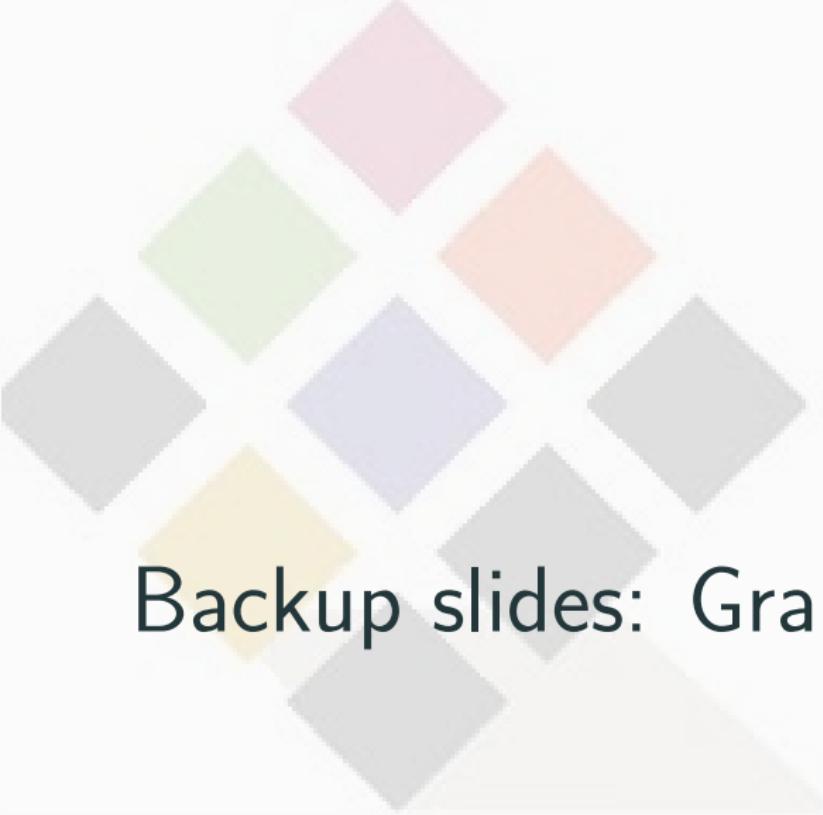


AI in Economics and Ethics: Regulatory Challenges

- 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

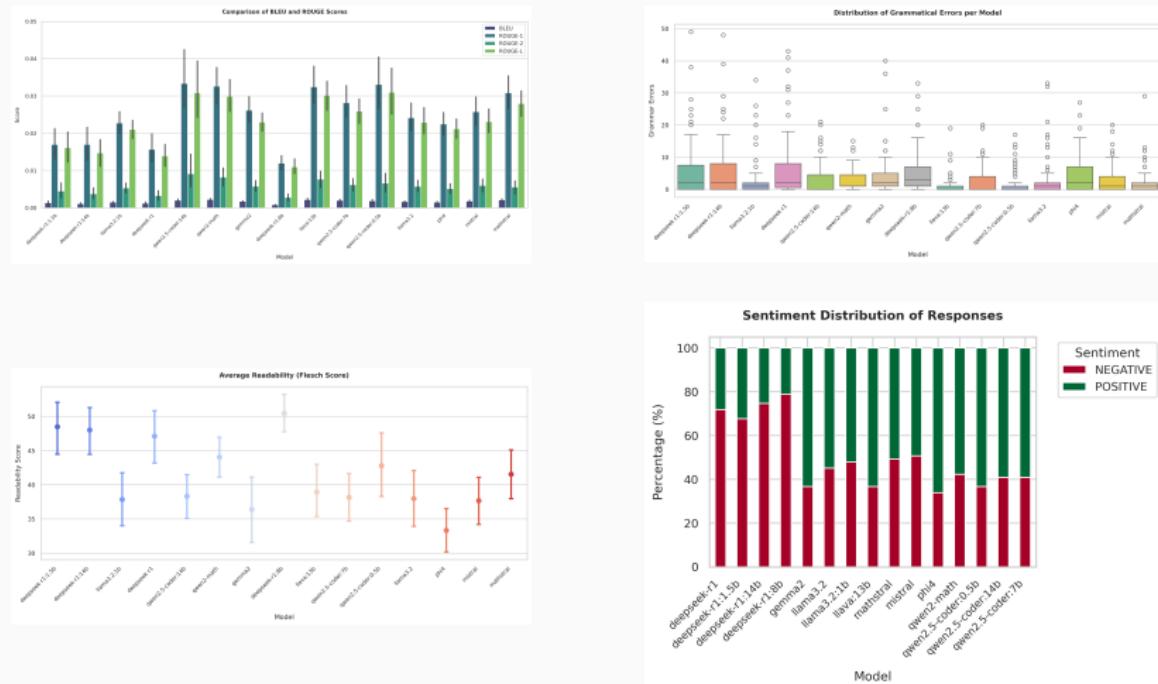


Figure 1: Evaluation Results of AI Models



Evaluation Results: Quantitative metrics

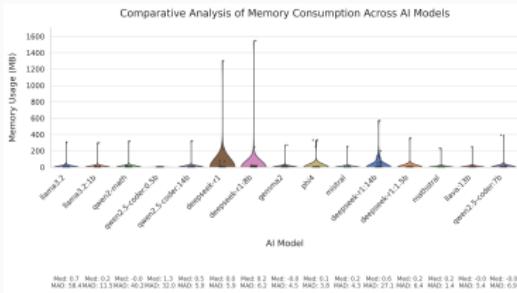
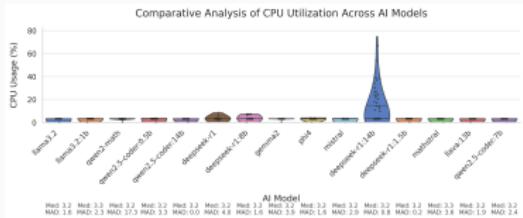


Figure 2: CPU Usage Comparison

Figure 3: Memory Usage Comparison



Figure 4: response time comparison of different models

