Vojtěch Sýkora

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sykoravojtech.de@gmail.com | +49 1573 1155858 | Czech Citizen | Born 10/03/2001

Skills

Programming Languages: Python (PyTorch, NumPy, Pandas, Matplotlib, OpenCV, TensorFlow), C++, LaTeX, Markdown

Development Tools: Git, Github, Linux, VS Code, GitLab, Canva

Languages: English (C1), German (B1), Czech (Native)

Experience

Synthavo, Machine Learning Engineer — Stuttgart, Germany, Dec 2024 – Present

- Developing a **multi-modal** pipeline for extracting and analyzing switchboard schematics.
- Engineering end-to-end solutions including **object detection**, **instance segmentation**, **rotation recognition**, **text recognition**, and **edge detection**.
- Designing preprocessing and labeling strategies to handle diverse schematic layouts.
- Extracting semantics from intricate electric diagrams to deliver actionable insights for enterprise customers (market cap up to €180B).

Czech Institute of Informatics, Robotics and Cybernetics, Machine Learning Researcher — Prague, Czechia, Mar 2023 – Jul 2023

- Conducted research on identifying the most congested areas in urban environments, focusing on Dublin and Luxembourg.
- Developed and adapted gravitational **clustering** techniques to detect high-traffic regions, optimizing urban mobility analysis.
- Contributed to a larger framework integrating **centralized traffic routing** into the SUMO traffic simulation environment.
- Worked with publicly available traffic datasets, applying data-driven approaches to identify problematic traffic zones.
- **Co-authored a paper** submitted to Expert Systems with Applications (ESWA), Elsevier.

Charles University, Data Scientist — Prague, Czechia, Jul 2020 – Dec 2022

- Project 1 (2020): Analyzed 600K+ records in MySQL using Python-based algorithms to compare and extract key insights.
- Project 2 (2022): Developed an **animated choropleth map** for visualizing demographic shifts (Python, GeoJSON, NumPy, Pandas, Plotly).

US Air Force Research Lab & CTU FEE AI Center, Artificial Intelligence Researcher — Prague, Czechia, Sep 2021 – Jul 2022

- Contributed to the FRAS (Flexible and Resilient **Autonomous Systems**) research project, funded by the US Air Force Research Lab.
- Developed a Python and PDDL-based **environment generator** to train single and multi-agent AI planning strategies.
- Applied **classical planning** and **game theory** concepts to create robust algorithms for adversarial environments.

Education

University of Tübingen, Master's in Machine Learning — Oct 2023 – Sep 2025

- Full scholarship from the DAAD for the entire study program of 2 years.
- Focused on **Deep Learning**, **Computer Vision**, and **Reinforcement Learning**.

- Thesis: **Multi-modal Deep Learning** for Automated Schematic Analysis.

Czech Technical University in Prague, Bachelor's in Open Informatics Sep 2020 – Jun 2023

- Computer Science studies with a **focus on Artificial Intelligence**.
- Thesis: Proximal Policy Optimization for Car Racing with unpredictable Wind.

prg.ai & Czech Technical University in Prague & Charles University, Prague AI Minor 2021 – 2023

- An **interdisciplinary Artificial Intelligence curriculum** bringing together students, teachers, and researchers from prestigious Prague universities.

Projects

Video Transformers for Classification and Captioning Code Paper Mar 2024 – Jul 2024

- Developed a **transformer-based** pipeline leveraging **SVT** and **Video Mamba** models on the Charades dataset.
- Engineered a **custom data processing** pipeline with sliding window inference, achieving up to 29.82 mAP.
- Integrated a GPT-2 based decoder for captioning, achieving BLEU-1 scores above 0.22.
- Tools Used: PyTorch, PyTorch Lightning, OpenCV, Weights & Biases, Scikit-learn.

Instance Segmentation Challenge Code Oct 2024

- Leveraged **Detectron2** for accurate 2D instance segmentation using bounding boxes and masks.
- Used a pre-trained **Mask R-CNN** model, achieving an overall Average Precision (AP) of 46.1.
- Tools Used: PyTorch, Detectron2, Mask R-CNN.

Ischemic Heart Disease Analysis in Germany Code Paper Oct 2023 – Apr 2024

- Conducted an analysis of ischemic heart disease (IHD) in Germany, identifying key risk factors.
- Applied **statistical analysis** and **Random Forest regression** to assess healthcare and lifestyle impacts.
- Found that alcohol consumption, median age, and healthcare expenditures significantly affect IHD mortality.
- Tools Used: Random Forest, SHAP Analysis, Matplotlib, Pandas, NumPy.

Urban Traffic Control Framework Code Mar 2023 – Jul 2023

- Conducted research on congested areas in Dublin and Luxembourg, optimizing urban mobility analysis.
- Adapted **gravitational clustering** techniques to detect high-traffic regions.
- **Integrated centralized traffic routing** into the SUMO traffic simulation environment.
- **Co-authored a research paper** submitted to Expert Systems with Applications (ESWA) journal, Elsevier
- Tools Used: Traffic Simulation, SUMO, PDDL, Gravitational Clustering, Python.

Interests

Flying a Drone, Traveling to Islands, Baking

March 17, 2025