Xianghe Ma

(+49) 152 0834 8592
xiaohemaikoo@gmail.com
Github: xiaohemaikoo

Education

2021–2024 **Heidelberg University**,
Scientific Computing, Master of Science.

2020–2021 **RWTH Aachen University**,
Data Analytics and Decision Science, Master of Science,
Remote study due to COVID-19 pandemic. Transferred to Heidelberg University.

2013–2017 **Shandong University of Science and Technology**,
Computer Science and Technology, Bachelor.

Experience **(about 4 years)**

since 05/23 **Hyundai Mobis Parts Europe**, ***Computer Vision Engineer***, - **internship**.
- **Description:** scientific visualization and scene perception for autonomous driving.
- **Tools & Programs:** python, typescript, react, fastAPI, PyDantic, deck.gl 3D, konva, SLAM, camera, Lidar, semantic segmentation, multiview geometry, NeRF, deep learning, NN quantization, ONNXRuntime.

11/22 - 12/23 **Heidelberger Institut für Theoretische Studien(HITS)**, ***NLP Researcher***, - **temporary contract**.
- **Description:** part of the natural language processing group, research on the evolution of lexical semantics.
- **Tools & Programs:** python, machine learning, geometric deep learning, BERT, statistics, clustering, dynamic word embedding, GPT-4, LLaMA-3, LLMs, prompt engineering, computational linguistics.

11/22 - 05/23 **Institute of Geography of Universität Heidelberg**, ***Research Assistant***, - **temporary contract**.
- **Description:** implement the 3D/4D Lidar point cloud photogrammetry change analysis algorithm.
- **Tools & Programs:** python, c++, topographic 3D/4D point clouds analysis.

05/22-10/22 **Scientific Software Center of Universität Heidelberg(SSC)**, ***Research Assistant***, -**temporary contract**.
- **Description:** develop natural language processing and computer vision software tools for scientific research.
- **Tools & Programs:** python, c++, AI algorithms, ImageAI, Flask, opencv, web design.

07/17-10/19 **Beijing Huawei Digital Technology Co., Ltd.**, ***Software Engineer***, - **full time job**.
- **Description:** develop Huawei browser kernel and Huawei mobile browser app, develop Huawei router and firewall gateway network devices.
- **Tools & Programs:** c/c++, c#, java, javascript, debuggers, android, chromium, webview, DPDK, SDN, high performance computing, parallel computing, multi-threading, software design patterns, Windows, Linux, Android, toolchains, Make, Cmake, Ninja, Git, SVN, Jenkins, Docker, Virtualization.

Projects

since 05/23 **Autonomous driving online development tool [Hyundai Mobis]** .
- Implement image segmentation using the Segment Anything framework, achieving real-time segmentation on the frontend.
- Train the neural network for scene perception and offline annotation, such as object detection, segmentation, depth, key points detection, optical flow, scene flow, and dense and long-range motion from a video sequence.
- Develop visualization and annotation web tools for scene perception, implement 2D and 3D web viewers to visualize and interact with the raw sensor data and annotations, such as multi-camera images, Lidar point clouds, GPS trajectory, key points, objects, free space, segmentation masks, vSLAM key points and trajectory.
- Optimize backend logic and frontend realtime rendering.

04/23 - 05/24 **Lexical semantic change across time and languages [Universität Heidelberg & HITS]** .
- Research on the cross-language lexical semantic changes, design an unsupervised clustering model applied to mBERT word embeddings to generate temporal-spatial dynamics of lexical semantic changes. This work was published at the conference EACL2024. [Code].
- Design a lexical semantic change detection model to detect novel senses not present in the dictionary. Utilize the capabilities of large language models to summarize the detected novel senses and generate dictionary definitions. This work is published at the 5th International Workshop on Computational Approaches to Historical Language Change 2024 (LChange24). [Code].

11/22 - 05/23 **The 'py4dgeo' 4D point cloud analysis library [Heidelberg Institute of Geography] [Code]**.
- Implementing m3c2-ep topographic 4D point cloud analysis algorithms on the 'py4dgeo' framework.

09/22 - 10/22 **Baidu PaddlePaddle Hackathon 3 [Baidu Technology Co., Ltd] [Code1] [Code2]**.
- Optimize Deep learning operators (APIs) support float16 precision.
- Tools: pytorch, paddlepaddle, python, c++, GPU cuda programming, deep learning API.

04/22 - 10/22 **AI Media and Misinformation Content Analysis Tool [SSC] [Code]** .
- Image processing, AI text recognition, AI object recognition, website design.

03/22 - 03/22 **Sparse 3D Reconstruction: Structure from Motion (SfM) [Universität Heidelberg] [Code]**.
- Implement SfM algorithm with both calibrated camera and uncalibrated camera.
- Implement feature points detection and matching, estimating fundamental matrix, camera self-calibration, camera pose estimation, triangulation and bundle adjustment, 3D point cloud visualization.

08/18 - 10/19 **Huawei mobile browser [Huawei]**.
- Develop Huawei browser kernel (c++), Huawei browser app and Huawei browser webview (java + Android).
- Supported the design and upgrade of browser kernel and app features based on the Chromium project, one of the most complex large-scale software systems with 32 million lines of code written in C/C++, Java, Python, Android, C#, and web programming languages, utilizing advanced software design patterns.

07/17 - 08/18 **Huawei network software of fusion gateway and access route in cloud computing [Huawei]**.
- Use DPDK to adapt ARM and x86 chips in compiling and packet forwarding.
- Design and optimize high performance dynamic network forwarding algorithm to achieve load balancing in Multi-core threads and Multi processes. Optimization techniques such as DMA, shared memory, zero-copy transfers, cache alignment, cache miss reduction, CPU affinity, HugePages, inline assembly, disassembly, lock-free multi-threads were deployed.
- Design software crash diagnosis algorithms, apply DPDK Virtual NIC, Vhostuser, KNI.

Skills

Programming Python, C/C++, C#, Java, JavaScript, GPU cuda, SQL, NoSQL, Matlab, Object-orientated program

Frameworks PyTorch, TensorFlow, OpenCV, Open3D, Chromium, DPDK, Eigen, ROS, Android, Windows, Linux

Web design Frontend, Backend, HTML/CSS, JavaScript, Nginx, Servlet, PHP, FastAPI, Flask, Sanic, React

Utilities Anaconda, Git, SVN, Latex, UI Design, Jupyter notebook, Shell script, Compile script, Databank, Perf tools, Debug on C/C++ JavaScript, Docker/Containers, Kubernetes, Jenkins

Computer vision Scene flow, Optical flow, 3D reconstruction, SFM, SLAM, Monocular/Binocular vision, multiview geometry, NeRF, 3D Gaussian Splatting.

NLP Static and dynamic word embedding, Contextualized word embedding, Word2vec, BERT, GPT, Diffusion.

Deep learning FNN, CNN, GNN, GAN, RNN, LSTM, Reinforcement learning, Transformer, Geometric deep learning.

Languages English(fluent), Chinese(native), German(elementary)

Publications

2024 **Xianghe Ma, Dominik Schlechtweg, Wei Zhao**, Presence or Absence: Are Unknown Word Usages in Dictionaries, (LChange24) .

2024 **Xianghe Ma, Michael Strube, Wei Zhao**, Graph-based Clustering for Detecting Semantic Change Across Time and Languages, (EACL 2024).
https://aclanthology.org/2024.eacl-long.93/

2023 **Delia Dumitrescu, Inga S. Ulusoy, Petr Andriushchenko, Gwydion Daskalakis, Dominic Kempf, and Xianghe Ma**, *AMMICO*, an AI Media and Misinformation Content Analysis Tool.

Achievements

09/2022 **Contributions to Baidu PaddlePaddle open source deep learning platform community** .

03/2018 **Outstanding New Employee of Huawei Co., Ltd**.

About me

In my spare time, I enjoy video games, reading, swimming, skiing, cycling, and traveling. My interests lie in 3D vision, artificial general intelligence, and physics.