Xianghe Ma

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Education

2021–2024	**Heidelberg University**, *Scientific Computing*, Master of Science.
2013–2017	**Shandong University of Science and Technology**, *Computer Science and Technology*, Bachelor, *Minor in Business Administration*, Bachelor.

Experience (more than 4 years)

May 2023 - Ongoing — **Hyundai Mobis Parts Europe**, Computer Vision Engineer.
- As a computer vision engineer working on scientific visualization and scene perception for autonomous driving.

Nov 2022 - Dec 2023 — **HITS/ Heidelberger Institut für Theoretische Studien**, Hiwi/ Researcher.
- As a researcher in the natural language processing group, research on the evolution of lexical semantics.

Nov 2022 - May 2023 — **Institute of Geography of Universität Heidelberg**, Hiwi/ Research Assistant.
- Be the research assistant, independently implement the 3D/4D point cloud photogrammetry change analysis algorithm based on the py4dgeo open source framework.

May 2022 – October 2022 — **IWR SSC/Scientific Software Center of Universität Heidelberg**, Hiwi/ Research Assistant.
- Develop research software tools, build natural language processing and computer vision software tools.

July 2020 – Feb 2021 — **Beijing Wangshen Information Technology Co., Ltd**, Full time job/ Software Engineer.
- Be a senior software engineer, participated in the project of browser kernel development.

July 2017 – Oct 2019 — **Beijing Huawei Digital Technology Co., Ltd.**, Full time job/ Software Engineer.
- Be a senior software engineer, participated in Huawei browser kernel and Huawei browser app development.
- Be a software engineer, participated in Huawei router and firewall gateway network equipment development.

Projects

May 2023 – Ongoing — **Autonomous driving online development tool [Hyundai Mobis]** , *Frontend, Backend, Scientific Visualization* , *python, react, fastAPI, web design, deck.gl, react-konva, SLAM, semantic segmentation, scene understanding, multiview geometry, NeRF*.
- Implement real-time online image semantic segmentation based on Meta AI segment anything framework.
- Train the neural network for scene perception, estimating optical flow, scene flow, and dense and long-range motion from a video sequence.
- Develop 3D vSLAM scientific visualization tools. Render multi-sensor fusion point cloud of the Map, driving trajectory, driving trajectory of vSLAM localization, and sensors trajectory. Perform 2D to 3D key point matching, projection, and rendering.
- Optimize backend logic and frontend realtime rendering.

April 2023 – May 2024 — **Language Evolution: The temporal and spatial dynamics of multiple languages [Universität Heidelberg & HITS]** , *Computational Linguistics* , *python, deep learning, geometric deep learning, BERT, statistics, clustering, dynamic word embedding, GPT-4, LLaMA-3*.
- 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. The results were published in the conference EACL2024.
- 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. The results are published at the 5th International Workshop on Computational Approaches to Historical Language Change 2024 (LChange24).

Nov 2022 – May 2023	**The 'py4dgeo' 4D point cloud analysis library [Heidelberg Institute of Geography] [Code]**, *Topographic 3D/4D point clouds analysis* , *python, c++.*
	○ Implementing m3c2-ep topographic 4D point cloud analysis algorithms on the 'py4dgeo' framework
Sep 2022 – Oct 2022	**Baidu PaddlePaddle Hackathon 3 [Baidu Technology Co., Ltd] [Code1] [Code2]**, *Deep learning API* , *pytorch, paddlepaddle, python, c++, GPU cuda programming*.
	○ Deep learning operators (APIs) support float16 precision.
April 2022 – Oct 2022	**AI Media and Misinformation Content Analysis Tool [IWR SSC] [Code]** , *Image Processing, Data Processing* , *python, c++, AI algorithms, ImageAI, Flask, opencv, web design*.
	○ Image processing, AI text recognition, AI object recognition, website design.
Mar 2022 – Mar 2022	**Sparse 3D Reconstruction using Structure from Motion (SfM) [Universität Heidelberg] [Code]**, *Computer Vision 3D Reconstruction, python, opencv, open3d*.
	○ 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.
July 2020 – Feb 2021	**Qianxin Browser [Wangshen Information Technology]**, *c++, javascript, android, linux, windows*.
	○ Develop browsers (kernels) for Windows, Linux, Android and other OS, based on Google Chromium.
Aug 2018 – Oct 2019	**Huawei Browser [Huawei Digital Technology]**, *c++, java, javascript, android, chromium, webview*.
	○ Develop Huawei browser kernel, Huawei browser app, Huawei browser webview component via Chromium.
July 2017 – Aug 2018	**Huawei network products of Firewall Fusion Gateway and Huawei Access Route [Huawei Digital Technology]**, *c/c++, DPDK, SDN, high performance computing, parallel computing*.
	○ Develop boxed firewall network devices and virtual firewall network devices.
	○ Use DPDK to adapt ARM chips in compiling and packet forwarding. Design and develop high performance forwarding algorithm. Multi-threading parallel algorithms. Multi-process shared memory.
	○ Design network forwarding algorithms, software crash diagnosis, apply DPDK Virtual NIC, Vhostuser, KNI.

Skills

Programming	Python, C/C++, Java, JavaScript, GPU cuda, SQL, NoSQL, Matlab
Frameworks	PyTorch, TensorFlow, OpenCV, Open3D, Chromium, DPDK, Libuv, Eigen, Android, Windows, Linux
Web design	Frontend, Backend, HTML/CSS, JavaScript, Nginx, Servlet, PHP, FastAPI, Flask, Sanic, React
Utilities	Anaconda, Git, Latex, UI Design, Jupyter notebook, Shell script, Compile script, Databank, Perf tools, Debugging on C/C++ Java Python JavaScript, Docker/Containers, Kubernetes
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, 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). https://arxiv.org/abs/2406.00656
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

Sep 2022	**Contributions to Baidu PaddlePaddle open source deep learning platform community [Code]**.
Mar 2018	**Outstanding New Employee of Huawei Co., Ltd**.