ALEX SHELDRICK

Munich, Germany
+49 157 7133 2918
alex.sheldrick@tum.de
alex-sheldrick.com
github.com/AlexSheldrick

SUMMARY

Dual M.Sc. in AI and Physics with two years' research experience in a leading university AI lab. Comfortable developing clean and performant Python code for 3D Deep Learning research with PyTorch. Bilingual in German and English, with extensive experience in preparing, visualizing and analyzing data from published Physics research and professional Data Science certificate coursework.

EDUCATION

Master of Science | **Grade: 1.7** | *Robotics, Cognition, Intelligence*   2023
Technical University of Munich

Bootcamp | **Grade: 1.0** | *Datascience with Python*   2020
Technical University of Berlin

Master of Science | **Grade: 1.2** | *Physics*   2020
Technical University of Berlin

EXPERIENCE

Research Assistant   Apr. 2021 – Mar. 2023
Visual Computing & Artificial Intelligence Group   Munich, Germany

- Performed grant-funded deep learning research focusing on the rapid development, iteration, and deployment of machine learning models for real-world applications
- Specialized on 3D computer vision, e.g. implicit representations of scenes, point-clouds and meshes
- Achieved 50-90% reduction in data required for photorealistic reconstruction of scenes with neural radiance fields by deriving a probabilistic novel loss for RGB-D supervision
- Compiled weekly progress reports of projects and of relevant published literature for international teams

SKILLS

Programming languages: Python, C++, SQL
Frameworks: PyTorch, NumPy, SciPy, Matplotlib, Seaborn, Pandas, scikit-learn, OpenCV, Git
Specialization: Machine Learning, Computer Vision, Deep Learning
Languages: Native / bilingual proficiency in German (C2) and English (C2). Italian (C1)
IBM Data Science Professional Certificate: Data visualization, machine learning algorithms, statistical analysis
AWS Fundamentals Specialization: Security, migration strategies, serverless application building

SELECTED MACHINE-LEARNING & COMPUTER VISION PROJECTS

Neural Radiance Field Reconstruction with Depth and Normal Constraints   Spring 2023
Python | PyTorch | *Neural Radiance Field (NeRF)*

- Project with goal to reduce amount of data necessary for the application of machine learning algorithms: data analysis and visualization outlined actionable insights and led to derivation of novel loss
- Improved reconstruction quality by 24% in sparse view setting by formulating a novel method leveraging RGB-D sensors for NeRFs
- Realized a 50-90% training data reduction for photorealistic reconstructions by incorporating depth data
- Improved model-training time by 4x compared to the baseline without novel CDF depth supervision

3D Reconstruction: single-view colored mesh generation Fall 2021

Python | PyTorch | *3D CNN encoder-decoder architecture*

- Achieved a 2.7% improvement in IoU and a 464% reduction in Chamfer-L1 distance over contemporary 2D encoder decoder works by utilizing point-to-image plane projections for feature-map sub-selection
- Developed a 3D Convolutional Neural Network integrating both local and global features, producing fully colored meshes from single images by incorporating depth and camera parameters

Object detection using Random Forests Spring 2020

C++ | OpenCV | *Random Forests on sliding window, HoG & NMS for refinement*

- Achieved 95% accuracy in an object detection pipeline targeting three unique classes, by employing Histogram of Oriented Gradients for feature extraction and random forests for window classification
- Attained a combined 83% recall at 86% accuracy by incorporating selective search for region proposals (intersection over max area) and refining results with Non-Maximum Suppression for bounding boxes

ACHIEVEMENTS AND GRANTS

Fellowship Grant Apr. 2021

Awarded to excellent Master's students to perform independent research in Visual Computing & AI

WoW Arena World Champion (Arena World Championship) Nov. 2017

Founded and led an esports team to victory in a premier tournament with a $280,000 prize pool

PUBLICATIONS

Nieto, P., Müller, D., Sheldrick, A., Günther, A., Miyazaki, M., & Dopfer, O. (2018). Effect of alkali ions on optical properties of flavins: Vibronic spectra of cryogenic m+lumichrome ions (m = li–cs) in the gas phase. *Phys. Chem. Chem. Phys.*, *20*, 22148–22158. doi:10.1039/C8CP03950J

Sheldrick, A., Müller, D., Günther, A., Nieto, P., & Dopfer, O. (2018). Optical spectroscopy of isolated flavins: Photodissociation of protonated lumichrome. *Phys. Chem. Chem. Phys.*, *20*, 7407–7414. doi:10.1039/C8CP00590G

Günther, A., Nieto, P., Müller, D., Sheldrick, A., Gerlich, D., & Dopfer, O. (2017). Berlintrap: A new cryogenic 22-pole ion trap spectrometer. *Journal of Molecular Spectroscopy*, *332*, 8–15. Molecular Spectroscopy in Traps. doi:https://doi.org/10.1016/j.jms.2016.08.017