Faiz Ul Wahab

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WORK EXPERIENCE

NYRIS GMBH, *Deep Learning Research Scientist*   April 2017 - Present
I work primarily on visual recogniiton, object detection, motion estimation and tracking:

- ***Visual Recognition.*** Developing quality metrics and embedding algorithms for visual search for large scale product databases with real-time performance.

- ***Object Detection.*** Developed an attention based object proposal algorithm that identifies generic objects in an image. This is to facilitate visual search for multiple objects present in a single image and to remove clutter against object of interest.

- ***Motion Estimation and Tracking.*** Developed a real-time algorithm that identifies and tracks people in crowd based scenarios. This work is primarily based on person detection, tracking and person re-identification pipeline.

- ***Scene Text Recognition.*** Developing a custom text recognition algorithm for text localization and transcription in challenging real-world scenarios. Currently working on attention based Long Short-term memory networks (LSTMs) and Gated Recurrent Units (GRUs) to perform recognition in real-time.

TECHARETE, *Computer Vision Software Engineer*   July 2013 - June 2014
Semantic Visual Search. Worked on multimedia information retrieval for broadcast monitoring and ad tracking. This mainly involved classical computer vision for features extraction, codebook creation feature indexing and retrieval based on various voting schemes. The end product provided ad tracking on 10 Television channels and 5 Radio channels.

TU KAISERSLAUTERN, *Research Intern*   April 2012 - August 2012
Document Image Analysis. Worked in the Image Understanding and Pattern Recognition(IUPR) group under Prof. Thomas Breuel and Prof. Sohaib Khan on the project Mapping Rural Pakistan(MARUP), which involved digitizing cadastral maps. My primary tasks were an extensive literature review for segmentation, form processing and related areas, implementation of segmentation algorithms for character segmentation and line extraction. Also, one of my main tasks was to design an appropriate metric for evaluation of the algorithms.

PUBLICATIONS

[1] *Chennuru Vankadara, L., *Haghiri, S., *** Wahab, F.**, *Lohaus, M, Luxburg, U., *Insights into Ordinal Embedding Algorithms: A systematic evaluation.*, *arXiv:1912.01666v3*, **Under review** in the 24th Conference on Artificial Intelligence and Statsitics **(AISTATS 2021)**.

[2] Wieser, I., Toprak, S., Grenzing, A., Hinz, T., Auddy, S., Karaoguz, E.C., Chandran, A., Remmels, M., El Shinawi, A., Josifovski, J., Chennuru Vankadara, L., **Wahab, F.**, Mollaalizadeh Bahnemiri, A., Sahu, D., Heinrich, S., Navarro-Guerrero, N., Strahl, E., Twiefel, J., Wermter, S.: *A Robotic Home Assistant with Memory Aid Functionality*, 39th German Conference on Artificial Intelligence **(KI 2016)**.

POSTERS AND COMPETITIONS

[1] *Sultanpete Govindappa, K., *** Wahab, F.**, *Hesse, L., *Delf Attention Pooled Features*, in the International Computer Vision Summer School **(ICVSS 2019)**.

*Indicates Equal Contribution.

[2] Wieser, I., Toprak, S., Grenzing, A., Hinz, T., Auddy, S., Karaoguz, E.C., Chandran, A., Remmels, M., El Shinawi, A., Josifovski, J., Chennuru Vankadara, L., Wahab, F., Mollaalizadeh Bahnemiri, A., Sahu, D., Heinrich, S., Navarro-Guerrero, N., Strahl, E., Twiefel, J., Wermter, S.: A Robotic Home Assistant with Memory Aid Functionality (May 2016), `https://www.informatik.uni-hamburg.de/wtm/videos/VideoSubmission_UniHamburgWTM_RO-MAN2016.mp4`, video. IEEE RO-MAN 2016.

EDUCATION

MASTERS IN INTELLIGENT ADAPTIVE SYSTEMS October 2014-19
Universitat Hamburg
> Specialization: Computer Vision, Machine Learning, Deep Learning, Data Analysis. *Thesis:Interpretation of Neural Networks for Eye Fixation Prediction* **Overall Grade: 1.59**

BACHELORS OF SCIENCE IN COMPUTER SCIENCE Aug 2009 - Jun 2013
Lahore University of Management Sciences
> Specialization: Image Processing, Computer Vision, Computer Graphics. *Thesis: Estimating Geometry and Reflectance from a Single Image*

SCHOLARSHIPS AND AWARDS

- **High Achievers Award:** Awarded a scholarship worth 75% tuition fee for attending Bahria College Islamabad from 2007-09 during A-Levels

- **DAAD Scholarship:** Awarded DAAD funding for a research internship in TU Kaiserslautern from April 2012 - August 2012.

OTHER WORK EXPERIENCES

UNIVERSITAT HAMBURG, *Research Assistant at KOGS Group* October 2015 - March 2017
Interactive Image Processing. Worked as an image processing developer on the Advanced Manuscripts Analysis Portal(AMAP) project, headed by Prof. H. Siegfried Stiehl. My primary tasks were to implement image processing functionality for manuscript analysis and integrate them into a server. Also, a frontend interface had to be build to facilitate manuscript scholars in using the tool in an intuitive way.

UNIVERSITAT HAMBURG, *Research Assistant at WTM Group* June 2015 - September 2015
Simulated interactive environments. Creation of simulated interactive environments for experimentation in object tracking, sound localization and gesture recognition.

LAHORE UNIVERSITY OF MGMT. SCIENCES, *Research Assistant* June 2011 - June 2013
Geometric Vision. Worked on various projects in the Computer Vision Lab with Dr.Sohaib Khan. Initially, I worked on multiview 3D reconstruction using unordered images and then I worked on single view 3D reconstruction for outdoor scenarios.

TECHNICAL SKILLS

- **Languages:** Proficient in C++ and Python

- **Libraries:** OpenCV, scikit-learn, scikit-image, Tensorflow, Pytorch

MAJOR ACADEMIC PROJECTS

DEEP NEURAL NETWORKS FOR EYE FIXATION PREDICTION October 2017 - May 2018
Masters Thesis, Computer Vision Group, Universitat Hamburg

Abstract: We pose the problem of pixel-wise prediction as a tradeoff between semantics and localization. In this framework, a good pixel prediction model requires semantic features to be well localized in the image space. We use the encoder-decoder framework to define an architecture for saliency prediction. This shows that the traditional encoder-decoder model is incapable of localization of salient regions in the image. This can be observed in the predicted saliency map as bad localization and/or smearing effect. To mitigate this, we propose skip connections in the form of concatenation. This improves the localization precision of the predicted saliency map but introduces edge artifacts in the prediction. We propose a preprocessing mechanism that modulates the flow of only relevant features from the encoder to the decoder to help achieve good localization.

Keywords:

Deep Learning, Structure Prediction, Eye Fixation Prediction, Neural Networks, Semantic Segmentation, Localization

INTERACTIVE ROBOTIC MEMORY AID October 2015 - March 2016
Masters Project, WTM Group, Universitat Hamburg

Worked on the design, research and implementation of a robot that helps the elderly people in finding their misplaced belongings. Apart from design and research on how to bring about this idea, my sole contribution was designing the object detection functionality. My main goal was real time object detection and classification. This involved literature research on the state of the art in object detection and efficient algorithms for segmentation, object bounding box detection, feature extraction, feature representation and classification schemes. The end product was a robot that could explore its environment and localize and classify already learned objects.

Keywords:

Object Detection, Support Vector Machines, Random Forests, Neural Networks, Cross Validation, Segmentation, Feature Representation

GENETIC ALGORITHMS FOR VISION October 2014 - March 2015
Course Project, TAMS Group, Universitat Hamburg

Worked on creating textured 3D models using a prior 3D CAD model and images of the object. This involved study of genetic algorithms and their application in solving optimization problems. Firstly, a coarse model was created using multiview stereo on the images. Then it was refined by minimizing the discrepancy between the 3D model and observed intensity values in the corresponding images using genetic algorithms.

Keywords:

Genetic Algorithms, Multiview Stereo, 3D Reconstruction, 3D Alignment, Texture Mapping

ESTIMATING GEOMETRY AND REFLECTANCE August 2012 - May 2013
Bachelor Thesis, Lahore University of Mgmt. Sciences

Worked on geometric regularities in the urban environments like buildings(outdoor) and rooms(indoor). These regular structures can be exploited in digital images to infer the structure of the real world in 3D. In addition to this, I worked on how they geometric structures can be fused with the appearance models of objects to infer a fine grained structure from the image.

Keywords:

Shape Modeling, Lighting Models, Texture Modeling, Reflectance Models