Zhexiao Guo（国哲骁）

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Education Experiences

Master: 2013.09 ~ 2016.06	Department of Biomedical Engineering **Shenzhen University, China**
Bachelor: 2008.09 ~ 2012.06	Department of Computer of Science and Technology **Guangdong Pharmaceutical University, China**

Professional Experiences

Research Assistant: 2020.01 ~ Now	Department of Chinese and Bilingual Studies **Hong Kong Polytechnic University, Hong Kong**
Research Assistant: 2019.01 ~ 2019.12	Department of Biomedical Engineering **Shenzhen University, China**
Visiting Scholar: 2016.09 ~ 2018.12	Department of Computer and Information Sciences **Universität Konstanz, Germany**

Research Interests

Cognitive Science, Cognitive Neuroscience, Computational Modeling, Bilingualism, Language Acquisition. Computer vision, Pattern Recognition and Virtual Reality in Cognitive Science area.

Research Experiences

a) *A facial landmark detection method for unilateral peripheral facial paralysis (UPFP), Collaborator: Prof. Guo Dan, Status: Finished*

The facial landmark detection methods play a key role in the whole assessing procedure of such UPFP assessment methods. However, almost all facial landmark detection methods utilized in existing UPFP researches are constructed or trained by a healthy facial image dataset. A customized UPFP facial dataset with 68 facial landmark annotations was built. It contains 1840 labeled facial images of 92 UPFP patients in five different facial expression procedures. The resulting accuracy UPFP facial landmark detection models we trained in this paper reduce the mean error from 7.42 to 3.15 by 56% with the UPFP+300W dataset compared to the model only trained with the 300W dataset.

b) *Personalized 3D facial expression model for facial paralysis rehabilitation, Collaborator: Prof. Guo Dan, Status: Finished*

The stimulus intensity of visual feedback decides the treatment effect of mirror therapies. As a digital and quantified solution, the applying of the personalized 3D facial expression model could provide stronger stimulus intensity and accurate treatment evaluation. The facial expression model consisted of three parts, personalized 3D facial model, photorealistic facial texture and expression mapping algorithm. The 3D facial model and expression mapping algorithm were finished so far.

c) *Lower limb prediction from upper limb inertial data for gait rehabilitation, Collaborator: Prof. Guo Dan, Status: Finished*

The participating ability of patients could speed up the rehabilitation process for lower limb paralysis patients. Instead of the presetting driving method, a lower limb trajectory prediction method was proposed in this research to drive a lower-limb robotic system. An upper limb joint – lower limb joint trajectory database was built including about 20000 data from 20 subjects. So far, the best RMSE of lower limb trajectory prediction method based on a neural network is below 2.5.

d) *Quantifying Chinese calligraphic for achieving creative mixtures of personal styles, Advisor: Prof. Oliver Deussen, Status: Suspended*

The goal of this research is to enable a robot arm to create calligraphic artwork with limited or even without any human intervention. We tried to use learning methods to teach the robot different character styles and to mix between them in order to express different personalities and also different emotional modes of the writer. From sloppy to formal, from harmonic to exaggerated we want to be able to create calligraphy in the whole spectrum of emotions that were encoded by artists in their artworks.

e) *A computerized evaluation of facial palsy based on a customized camera system, Advisor: Prof. Guo Dan, Prof. Yongjin Zhou, Status: Finished*

This research is to help the doctor to evaluate the facial palsy patients faster and exacter than conventional manual evaluation. A computerized evaluation approach was proposed to evaluate the facial symmetry for the facial palsy based on a customized camera system. And a facial palsy image database for this project was built, including about 105 clinical subjects so far. After the image features captured by computer vision techniques, including the conventional and deep learning methods, the result of the computerized evaluation was gained by a trained classifier.

f) *An image enhancement with a vein viewer, Advisor: Prof. Guo Dan, Prof. Yongjin Zhou, Status: Finished*

An enhancement strategy to improve the quality of images from a customized low-cost binocular vein viewer system. The method outperforms the previously reported method, CLAHE, in both visual and quantitative evaluations on two datasets, Bosporus database and a dataset captured from the customized vein viewer system. The proposed strategy demonstrated better performance in the pre-processing stage for the vein viewer compared to CLAHE.

Skill Sets

- Fast learner in the engineering area;
- Language proficiency: English, TOEFL 82; Mandarin, native; Cantonese, fluent;
- Programming skill：Skillful in C, C++, C#, Java, Matlab and Python development.

Awards

✧ National Scholarship for Postgraduate/Graduate students in 2014.

Publications

1. **Zhexiao Guo**, Guo Dan, Jianghuai Xiang, Jun Wang, Wanzhang Yang, Huijun Ding, Oliver Deussen, and Yongjin Zhou. "An unobtrusive computerized assessment framework for unilateral peripheral facial paralysis." *IEEE journal of biomedical and health informatics* 22, no. 3 (2018): 835-841.
2. **Zhexiao Guo**, Minmin Shen, Le Duan, Yongjin Zhou, Jianghuai Xiang, Huijun Ding, Shifeng Chen, Oliver Deussen, and Guo Dan. "Deep assessment process: Objective assessment process for unilateral peripheral facial paralysis via deep convolutional neural network." In *Biomedical Imaging (ISBI 2017), 2017 IEEE 14th International Symposium on*, pp. 135-138. IEEE, 2017.
3. Dan, Guo, **Zhexiao Guo**, Huijun Ding, and Yongjin Zhou. "Enhancement of dorsal hand vein image with a low-cost binocular vein viewer system." Journal of Medical Imaging and Health Informatics 5, no. 2 (2015): 359-365
4. Feng, Jialing, **Zhexiao Guo**, Jun Wang, and Guo Dan. "Using Eye Aspect Ratio to Enhance Fast and Objective Assessment of Facial Paralysis." Computational and Mathematical Methods in Medicine 2020 (2020).
5. Jie He, Shaofa Chen, **Zhexiao Guo**, Sandeep Pirbhulal, Wanqing Wu, Jialing Feng, Guo Dan. “A Comparative Study of Motion Recognition Methods for Efficacy Assessment of Upper Limb Function.” International Journal of Adaptive Control and Signal Processing (2018).

6. Le Duan, Minmin Shen, Song Sui, **Zhexiao Guo** and Oliver Deussen, “Estimating 2D Multi-Hand Poses From Single Depth Images.” in ECCV workshop on Observing and Understanding Hands in Action, 2018.

Attended conferences

1. 2018 15th European Conference on Computer Vision, Workshop on Observing and Understanding Hands in Action.
2. 2017 4th China Visualization and Visual Analytics Conference, China-Germany Visualization Workshop.
3. 2017 IEEE 14th International Symposium on Biomedical Imaging.