Xiao-Su Hu
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SUMMARY

Motivated data/research scientist with 10+ years of experience with PhD degree. Passionate about problem research, data cleaning, feature engineering, and building models that solve or fix problems. Relevant skills include machine/deep learning, statistics, programming in Python/Matlab, research, problem solving and creative thinking.

EXPERIENCE

Assistant Research Scientist, University of Michigan ***2018 - Present***

- Led analysis of data collected from over 400 participants using hypothesis testing, linear mixed effect model, robust least square and Matlab, supporting 3 NIH grants, each last for 5 years with total budgeting over $ 2 million
- Developed a platform named Clinical Augmented Reality and Artificial Intelligence framework (CLARAi) by training NN/Customized CNN/ResNet/ on neuroimaging data collected from 60 participants using Pytorch. Achieved classification accuracy of 0.79, true positive rate (recall) of 0.7, with invention report filed within University of Michigan, and reported as cover page article “Facing Virtual Reality” of Health Guide 2017 Hour Detroit Magazine
- Developed a backend based on Flask and Postgres SQL for PainTrek mobile application, a free mobile application designed to empower users to effortlessly monitor and manage their pain, that attracted maximum user number of around 15,000
- Published more than 80 peer-reviewed journal articles and conference abstracts focusing on neuroimaging data cleaning, time series analysis, and linear regression, achieved 1034 total citation

Research Fellow, University of Michigan ***2013 – 2018***

- Performed data cleaning and preprocessing using methods like PCA, ICA, wavelet, interpolation on Python/Matlab platforms, and increased signal-to-noise ratio of neuroimaging data by 50 %
- Performed linear model fitting and hypothesis testing to the data, by applying pre-whitening and weighted least square to achieved R2 score of more than 60% variable explain ability.
- Developed a photogrammetry-based registration method to precisely localize imaging probes on the head, and achieved 60% accuracy in predicting detectable brain regions

EDUCATION

Ph.D., Cogno-Mechatronics Engineering ***02/2013***
Pusan National University, South Korea

M.Sc., Computer Science ***09/2008***
Cranfield University, U.K.

B.Eng., Control Engineering ***09/2007***
Beihang University, China

SKILLS

Python, SQL, Shell Script, MATLAB, Statistics, Pandas, NumPy, Matplotlib, Seaborn, Pytorch, Optuna, Wandb, AutoGluon, BigQuery, GitHub, Microsoft Word, Excel, PowerPoint

AWARDS/RECOGNITIONS

Silver Medal, Kaggle competition - Predict Student Performance from Game Play ***2023***

- Ranked top 4%, 76th out of 2051 Teams
- Used ensembled GBDT models with over 2000 manually engineered features

Bronze medal, Kaggle competition - Common Lit Evaluate Student Summaries ***2023***

- Ranked top 6%, 106th out of 2106 Teams
- Used stacked DeBerta v3 and LGBM with features generated using packages nltk, spacy, autocorrect

Selected Project Related Publications (Peer-reviewed)

Total peer-reviewed journal and conference publications: 88, total citation: 1034 (data from google scholar).

Data analysis methodology

1. Hu, X. S., et al. (2010). Kalman estimator- and general linear model-based on-line brain activation mapping by near-infrared spectroscopy. Biomedical Engineering Online. (Cited by 154, journal impact factor 4.0)
2. Hu, X. S., et al. (2013). Reduction of trial-to-trial variability in functional near-infrared spectroscopy signals by accounting for resting-state functional connectivity. Journal of Biomedical Optics. (Cited by 94, journal impact factor 3.8)
3. Hu, X. S., et al. (2015). Comparison of motion correction techniques applied to functional near-infrared spectroscopy data from children. Journal of Biomedical Optics. (Cited by 39, journal impact factor 3.8)
4. Hu X.S., et al. (2020). Photogrammetry-based stereoscopic optode registration method for functional near-infrared spectroscopy. Journal of Biomedical Optics. (Cited by 28, journal impact factor 3.8)

Data analysis application

1. Hu, X. S., et al. (2021). Brain Mechanisms of Virtual Reality Breathing Versus Traditional Mindful Breathing in Pain Modulation: Observational Functional Near-infrared Spectroscopy Study. Journal of Medical Internet Research. (Cited by 8, journal impact factor 7.4)
2. Hu X. S., et al. (2021) Shedding light on pain for the clinic: a comprehensive review of using functional near-infrared spectroscopy to monitor its process in the brain. Pain. (Cited by 8, journal impact factor 7.9)
3. Huang, Y., et al. (2019) Distilling neural representations of data structure manipulation using fMRI and fNIRS. IEEE/ACM 41st International Conference on Software Engineering (ICSE). Distinguished Paper Award. (Cited by 38)
4. Arredondo, M. M., et al. (2016). Bilingualism alters children's frontal lobe functioning for attentional control. Developmental Science. (Cited by 96, journal impact factor 4.33)
5. Hu, X. S., et al. (2011). Recognition of stimulus-evoked neuronal optical response by identifying chaos levels of near-infrared spectroscopy time series. Neuroscience Letters. (Cited by 86, journal impact factor 3.197)
6. Basura, G., et al. (2018). Human Central Auditory Plasticity; a Review of functional Near-Infrared Spectroscopy (fNIRS) to Measure Cochlear Implant Performance and Tinnitus Perception. Laryngoscope Investigative Otolaryngology. (Cited by 31, journal impact factor 2.13)

Clinical Augmented Reality and Artificial Intelligence framework

1. Hu, X. S., et al. (2019). Feasibility of a Real-Time Clinical Augmented Reality and Artificial Intelligence Framework for Pain Detection and Localization From the Brain. Journal of Medical Internet Research. (Cited by 30, journal impact factor 7.4)
2. Hu, X. S., et al. (2018). Brain functional changes before, during and after clinical pain. Journal of Dental Research. (Cited by 13, journal impact factor 8.9)
3. Racek, A. J., et al. (2015). Different Brain Responses to Pain and Its Expectation in the Dental Chair. Journal of Dental Research. (Cited by 21, journal impact factor 8.9)
4. Hu, X. S., et al. (2012). fNIRS-based online deception decoding. Journal of Neural Engineering. (Cited by 143, journal impact factor 3.9)

PainTrek Project

1. Kaciroti, et al. (2020). Sensory-Discriminative Three-Dimensional Body Pain Mobile App Measures Versus Traditional Pain Measurement With a Visual Analog Scale: Validation Study. Journal of Medical Internet Research. (Cited by 20, journal impact factor 7.4)