

HUI KANG

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EDUCATION

09/2012 - 06/2016 **Civil Aviation University of China** Tianjin, China
BEng in Electronic Information Engineering GPA of Major Courses: 3.7/4
Linear Algebra: 97, Advanced Mathematics: 94, C Programming Language: 92, Analog Electronic Technique: 93, Digital Electronic Technique: 91, Digital Signal Processing: 93, General Physics: 92

PUBLICATIONS

[3D-Object Modeling with Kinect in Indoor Condition](#). Civil Aviation Science and Education Research (Chinese version only), 2015

[Deep-Learning-Assisted Detection and Segmentation of Rib Fractures from CT Scans: Development and Validation of FracNet](#). EBioMedicine (by The Lancet), 2020

WORK EXPERIENCES

- 07/2021 - Now **Shukun Technology** Image Algorithm Engineer
- Involved in developing a clinical detection system for [Intracranial Hemorrhage \(ICH\)](#) based on deep learning technology, which could automatically process images and assess them for hemorrhage within minutes. Trained with thousands of non-contrast CT (NCCT) scans from several hospitals, the system could identify all types of suspected hemorrhage, including intraparenchymal (IPH), intraventricular (IVH), subdural (SDH), epidural (EDH) and subarachnoid (SAH), with a sensitivity of 96%, specificity of 94% and segmentation Dice coefficient of 88%.
- 08/2019 - 06/2021 **Diannei Technology** Image Algorithm Engineer
- Developed a clinically applicable deep learning system for rib fractures detection from CT scans, which achieved a high sensitivity of 92.9% with an average of 5.27 false positives per scan and reduced approximate 86% clinical time consuming. A paper was published in [EBioMedicine \(by The Lancet\)](#). A subset of the dataset was open-source to research community, which was the first open large-scale dataset in this application, and we successfully hosted [MICCAI 2020 RibFrac Challenge](#).
 - Developed a solution of 2D+1D CNN in Kaggle competition of RSNA Intracranial Hemorrhage Detection, which ranked top 8% among more than 1345 teams in 75 countries.
- 04/2017 - 07/2019 **SAP Labs China** Software Development Engineer
- Involved in developing Pulmonary Nodule Detection system named [Argus](#), responsible for designing false positive reduction model. Due to the limited size of the segmentation model structure and insufficient random negative samples, the morphological differences between the false detection areas and nodules couldn't be fully learned by the segmentation model. Therefore, I designed multimodal fusion to reduce misdiagnosis rate. Finally, the system achieved a high detection sensitivity of 96% with an average 5 false positives per case.
 - Involved in developing SAP core web framework [SAPUI5](#) by JavaScript, CSS and HTML5, responsible for designing crucial [Gantt Chart](#) control as core developer.
- 07/2016 - 03/2017 **Honeywell** Software Development Engineer
- Involved in developing the [Cockpit Flight Instrument](#) display system by C/C++ for Boeing company, which was used to display various flight parameters of aircraft graphically.

PROJECTS

- 08/2019 - 04/2020 **Deep-Learning-Assisted Detection and Segmentation of Rib Fractures**
- Extracted the bone areas through a series of morphological operations (e.g., thresholding and filtering) to speed up the detection. The intensity of input voxels was clipped to the bone window (level=450,

width=1100) and normalized to [-1,1].

- Developed FracNet to perform segmentation in a sliding window fashion. Used a balanced sampling strategy, applied data augmentation and combined soft Dice loss and BCE loss to alleviate the imbalance between positive and negative samples.
- Applied Radial Basis Function (RBF) to sliding window inference, so as to reduce the weights of the predictions near the edges of sliding window and get more accurate pixel level predictions, which increased sensitivity by 1.1%. Binarized the post-processed segmentation results and then computed connected components.

10/2019 - 11/2019 **RSNA Intracranial Hemorrhage Detection and Classification**

- The intracranial hemorrhage dataset contains many patients, each of which in turn contains multiple slices of varying numbers. Therefore, we designed a two-stage detection system to fully utilize the characteristics of the data.
- Combined the brain window (40, 80), subdural window (80, 200) and bone window (600, 2800) to form a 3-channel fused feature map for extracting features of different brain tissues. Then applied these features for transfer learning to train a strong feature extraction model.
- Extracted extractor's Global Average Pooling (GAP) layer features from adjacent slices in each patient's CT scans and combined all the features as a grouped feature. Finally, used all grouped features to train a classification model.

07/2018 - 12/2018 **Intelligent Detection of Pulmonary Nodules**

- Developed a 3D CNN segmentation model by combining ASPP, ResNet and UNet to detect multiscale pulmonary nodules with more accurate prediction positions.
- Developed 3 different 3D CNN classification models (ResNet, DenseNet, SEnet) and trained respectively with hard negative mining to reduce false positives of the segmentation model.
- Used Linear Regression (LR) to fuse the features learned by the models mentioned above to further reduce misdiagnosis rate of the segmentation model, which reduced false positives from 146.5 per scan to 5 per scan.

09/2015 - 06/2016 **Research on Moving Object Tracking Algorithm Based on MeanShift**

- Divided the area of each sliding window into small connected regions called cells, calculated each cell's color histogram and combined all color histograms as a group called block color histogram, like the histogram of oriented gradients (HOG) algorithm, which has a strong local feature representation capability.
- Used sliding window method to traverse the image and obtain all block color histograms. Finally, compared the similarity between adjacent images' all block color histograms to get the confidence map, then applied the MeanShift algorithm to iterate on the confidence map.

HONORS

12/2013	People First-class Scholarship	Ranking: 5%
12/2013	Tianjin Municipal People's Government Scholarship	Ranking: 1/169
12/2014	Rockwell Collins Scholarship	Ranking: 1/169
05/2015	Third Prize of Challenge Cup Tianjin Contest	Provincial Level
05/2015	Second Prize of Beidou Cup China Technology Invention Contest	National Level

SKILLS

Languages: Chinese, English

Machine Learning Tools: Numpy, Pandas, Scikit-Learn, Scikit-Image, OpenCV, PyTorch

Programming Languages: Python, C/C++, JavaScript, HTML5, CSS

Operating Systems: Unix/Linux, Windows