

# HUI KANG

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## EDUCATION

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09/2012 - 06/2016      **Civil Aviation University of China**      Tianjin, China  
B.S., Electronic Information Engineering      Major GPA: 3.7/4.0

Linear Algebra: 97/100, Advanced Mathematics: 94/100, Programming Design of C Language: 92/100

## WORK EXPERIENCES

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08/2019 - 04/2020      **Diannei Technology**      Image Algorithm Engineer  
➤ Developed a clinically applicable automatic deep learning system for rib fractures detection and segmentation from CT scans, which performed high sensitivity (92.9%) with average FPs (5.27) 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 is the first open large-scale dataset in this application, and now hosting [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 SAP core web framework [SAPUI5](#) by JavaScript, CSS and HTML5, responsible for designing crucial [Gantt Chart](#) control as core developer.  
➤ Involved in developing Pulmonary Nodule Detection system named [Argus](#), responsible for designing false positive reduction model, which achieved a detection sensitivity of 96% with 5 false positives per scan in LUNA16 dataset.

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.

## PUBLICATIONS

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**Hui Kang**, Chen Chen, Wenbo Hu, Ke Wu, Xiaoya Jin. [3D-Object Modeling with Kinect in Indoor Condition](#). *Civil Aviation Science and Education Research*, 2015 (Chinese version only)

Liang Jin, Jiancheng Yang, Kaiming Kuang, Bingbing Ni, Yiyi Gao, Yingli Sun, Pan Gao, Weiling Ma, Mingyu Tan, **Hui Kang**, Jiajun Chen, Ming Li. [Deep-Learning-Assisted Detection and Segmentation of Rib Fractures from CT Scans: Development and Validation of FracNet](#). *EBioMedicine (by The Lancet)*, 2020

## PROJECTS

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08/2019 - 04/2020      **Deep-Learning-Assisted Detection and Segmentation of Rib Fractures from CT Scans: Development and Validation of FracNet**

- 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 a customized 3D UNet named FracNet to perform segmentation in a sliding window fashion. Used a sampling strategy, applied data augmentation of random plane flipping and combined soft Dice loss and binary cross-entropy (BCE) as loss function 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: Identify Acute Intracranial Hemorrhage and Its Subtypes**
- Combined multiple window features in every patient's CT scans.
  - Developed a 2D CNN model as a feature extractor and trained with transfer learning.
  - 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 to obtain 2.5D features.
  - Developed a 1D CNN model as a classifier and trained with all grouped features.
- 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.
  - Used sliding window method to traverse the image and obtain all block color histograms.
  - 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.
- 09/2014 - 06/2015      **3D-Object Modeling with Kinect in Indoor Condition**
- Calibrated the Kinect color camera to obtain the camera's internal parameter matrix and aligned the depth camera with the color camera.
  - Created an inter-frame filtering algorithm based on joint bilateral filtering and used the filtering algorithm to fix depth images.
  - Obtained the point clouds through Point Cloud Library (PCL), used the Iterative Closest Point (ICP) algorithm to align all point clouds to the same coordinate system.

## **HONORS**

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

## **SKILLS**

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Languages: English, Chinese

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

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

Operating Systems: Unix/Linux, Windows