Kexin Ding

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SUMMARY

A second year Ph.D. student in computer science with strong coding skills and foundations of mathematic and algorithm. Hands-on experiences on deep learning models (CNN, GNN, Transformer) and machine learning algorithms. Published paper in top medical image conferences in the first year. Fast learning ability, able to understand and evaluate cutting edge paper in a short time.

EDUCATION

University of North Carolina at Charlotte *Charlotte, US*
Ph.D. in Computer Science; *09/2019 - now*
Advisor: Dr. Shaoting Zhang and Dr. Aidong Lu
Lehigh University *Pennsylvania, US*
M.S. in Computer Science *08/2017 - 05/2019*
Xidian University *Xi'an, China*
B.S. in Intelligent Science & Technology; *09/2013 - 06/2017*
(Minor: Computer Science)

INTERNSHIPS

SenseTime *Beijing, China*
Research Intern *06/2019-09/2019*
Description: Utilized CNN models for genetic mutation prediction using histopathological images in colon cancer.

- Collected 274 histopathological image in colon cancer from the Cancer Genome Atlas Colon Adenocarcinoma (TCGA-COAD) dataset and its genetic profile from Cbioportal.
- Segmented the foreground using OTSU. Split histopathological image into patches which are color-normalized by Macenko's method.
- Trained a tumor detection model and detected the tumor region patches (e.g.,10k) for gene mutation prediction.
- Utilized multiple CNN models to predict gene mutation on patches, and aggregated patch-wised prediction result as the gene mutation result of the histopathological image.

Intelligent Chip Engine Tech Co. Ltd. *Beijing, China*
Image Algorithm Engineer *07/2016-09/2016*

- Designed and modified the algorithms related to image/video intelligent analysis and processing.
- Conducted algorithm code implementation, optimization.

PUBLICATION

[MICCAI'20] Kexin Ding, Qiao Liu, Edward Lee, Mu Zhou, Aidong Lu, and Shaoting Zhang, "Feature-Enhanced Graph Networks for Genetic Mutational Prediction Using Histopathological Images in Colon Cancer.", InInternational Conference on Medical Image Computing and Computer-Assisted Intervention, pp. 294-304. Springer, Cham, 2020.

PROFESSIONAL SKILLS

Program languages: Python, Java, C, Scala
Operation system: Linux, MacOS
Framework & Package: PyTorch, PyTorch Geometric, Keras, Scikit-learn, Pandas, NumPy, Pillow, CUDA
Language: English, Mandarin

RESEARCH PROJECTS

- **Graph Neural Networks for COVID-19 Diagnosis Based on Computed Tomography Images**

  UNC Charlotte, US

  Supervisor: Dr. Mu Zhou *09/2020 – 03/2021*

  Description:
  - Proposed an agile transfer learning framework of graph neural networks and graph-wised data augmentation strategy to improve the efficiency and diagnosis accuracy of COVID-19 patients.

  Contribution:
  - Introduced a KNN-graph construction strategy that covert CT images to graph structure data.
  - Developed a light-weight network that is advantageous in dealing with small-scale data analysis that is widely seen in clinical applications.
  - Utilized graph-wised data augmentation methods to alleviate the overfitting and increase the latent graph representation which leads to the improvement of COVID-19 classification performance.

- **Feature-enhanced Graph Networks for Genetic Mutational Prediction** *UNC Charlotte, US*

  Supervisor: Dr. Mu Zhou *09/2019 – 02/2020*

  Description:
  - Proposed a feature-enhanced graph network for genetic mutation prediction using histopathological images in colon cancer.

  Contribution:
  - Introduced an efficient transformation method between WSIs and graph structure data. By focusing on generating spatially-connected graphs, the approach linked and explored local feature and global topological structure of WSI simultaneously.
  - Developed a feature-enhanced model to underscore discriminative feature learning. Improved the ability to distinguish non-isomorphic topological structure, and the ability to adaptively select the node representation from the different convolutional layers.
  - Utilized ensemble strategy of network models alleviates cancer heterogeneity to integrate multiple subgraph outcomes with a significant improvement in prediction performance.

- **House Condition Estimation** *Lehigh University, US*

  Supervisor: Prof Daniel Lopresti *01/2019 – 04/2019*

  Description:
  - Collected and built two datasets (house dataset and patch dataset) and trained ResNet50 for estimating house condition.

  Contribution:
  - Collected house image data by using google street view and labeled each of images. Extracted patches from the entire house image by applying SIFT and Kmeans.
  - Collected some image of doors, windows and roofs, etc. and labeled them. (External patch dataset).
  - Trained ResNet50 by external patch dataset to predict the label of extracted patches.
  - Aggregated patch-wise predictions to obtain a final prediction for the entire building.

- **Deep Attention Model for Multi-instance Relation Extraction** Lehigh University, US

  Supervisor: Prof Sihong Xie *08/2018 – 12/2019*

  Description:
  - Provided an Attention-based Bidirectional LSTM network for multi-instance relation extraction.

  Contribution:
  - Generated dataset from raw data and labeled for the mentions in the dataset.
  - Modified the attention-based bidirectional-LSTM model from the reference paper and trained the LSTM network by using our dataset.
  - Hyper-parameter optimization to get a better result.
  - Evaluated the model by accuracy and f1-score and compared the result with other models.