Hao Liu

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EDUCATION

Washington University in Saint Louis 08/2019-Now

Beijing Normal University, Beijing, China 09/2015-07/2019

Major: Mathematics GPA: 3.77/4.0 88.45/100

Core Courses: C Language and Programming (93/100); Data Structures and Algorithm Analysis (92/100); Probability Theory (93/100); Fuzzy Mathematics (94/100); Statistics (95/100); Synthesis Programing (99/100); Modern Control Theory (100/100); Deep Learning (96/100); Optimization Theory and Method (99/100).

College of William and Mary, Virginia, U.S.A. 07/2017-08/2017

Summer Course: Computer Problem Solving (4.0/4.0)

Prizes: Beijing Normal University first-class scholarship 10/2018

Meritorious price, Mathematical Contest in Modeling 02/2018

First prize in Beijing, China Undergraduate Mathematical Contest in Modeling 09/2017

RESEARCH EXPERIENCE

Time Associated Meta Learning for Clinical Prediction. |Study Project 06/2020-04/2021

- Problem: Predict the probability of disease occurring in different time period with few data.
- Use Meta Learning framework based on MAML, transfer the regression problem to a classification form
- Add information about other time-independent diseases as tasks.
- Apply Temporal information sharing strategy to time-associated tasks.
- Trained model on Barnes-Jewish Hospital's dataset and MIMIC III. The performance is better than that of multi-task learning network, deep neural network and traditional methods.

Meta Learning in Graph Neural Network. |Study Project 10/2021-Now

- Problem: Use meta learning to solve few-shot GNN problems based on nodes characteristic in graph.
- Develop a score calculator to represent node importance in a form of GNN.
- Proof the improvement of model accuracy after considering node importance.
- Trained model on Cora. The performance is better than current baselines.

Conducted the Human Action Recognition in Video with Deep Learning. |Team member 05/2017-05/2018

- Problem: The main content of this task is to recognize human behavior in video with the algorithm of deep learning, and I used KTH dataset to realize this content.
- Used Inception-v3 and used the activation output before the last pooling layer to extract feature representation on every frame in the video, then used frame vectors of the same length in all the frames to be the input of LSTM.
- Took use of the memory cell in LSTM to deal with long-time information in the video, thus used LSTM to classify different activities in the videos.
- Trained models on KTH dataset using TensorFlow. The recognition accuracy of boxing, hand clapping and jogging is almost 99% which is better than the accuracy of many earlier methods.

China Undergraduate Mathematical Contest in Modeling. |Team leader 09/2017

- Problem: The tasks in an APP are taking pictures in some specific places. Given a table containing data about task sites, the corresponding bonus for tasks and results of tasks, we are supposed to analysis existing pricing rules and provide a better pricing method to facilitate more tasks to be completed.
- Used K-Means to cluster the task points, and analyzed the degree of correlation between the selected factors and task results by Logistic regression, then filter factors according to the correlation and add new factors like difference between cities.
- Used WEKA and set up C4.5 decision tree to price places where the task failed. After test, the task success rate is obviously improved.

Improved Fuzzy c-means algorithm by genetic algorithm |Team leader 02/2017-01/2018

- Problem: Use Genetic algorithm(GA) to improve Fuzzy c-means (FCM algorithm).
- Used the global optimization ability of genetic algorithm to optimize the initial clustering centers of FCM since FCM can not achieve the global optimum.
- Applied real number coding, adaptive crossover and mutation probability in the GA algorithm. And the linear crossover operator and non-uniform mutation operator were used.
- After every iteration of GA, clustering centers were updated through FCM, which increased the rate of convergence.
- Result: Used three data sets with labels, and found that the improved algorithm had higher success rate and efficiency. But the limitation was that the improvement would be not obvious when processing high-dimensional data.

SKILLS

Programing: C, Python, MATLAB, Java

Language：English（Fluent）,Chinese(Native)

Other skills: Arduino, SolidWorks