Yixin Liu

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Guangzhou

EDUCATION

South China University of Technology Aug 2018 - Aug 2022

Major in Software Engineering (Bachelor) Guangzhou

Class Ranking: 3/67 **(4.47%)**   **English Ability:** CET-4: 598 CET-6: 533

Related Courses: *Principles of Compiler* (98), *Probability And Statistics* (100)*, Calculus* (97)*, Linear Algebra* (94), *Operating System* (90), *Artificial Intelligence* (93), *Algorithm Design and Analysis* (91), *Data Mining* (91), *Software design*(91)

Scholarship: National Scholarship (2020), First-Class Scholarship (2019)

RESEARCH EXPERIENCE

Conditional Automated Channel Pruning for Deep Neural Networks - First Author Jul 2020 - Sep 2020

- **Background**: *Channel pruning* is an important method in model compression. Under the condition of multiple compression rates, traditional methods have to repeat the searching process multiple times, which can be unnecessary and inefficient. To tackle the problem, we propose a *Conditional Automated Channel Pruning (CACP)* method that simultaneously produces compressed models under different compression rates through a single channel pruning process.

- **Work and Contribution:**
  - Formalize the problem as a Markov decision process (MDP), and design the state space and action space.
  - Purpose a RL-based framework to solve the MDP problem, and design a reward function based on *Reward Shaping*, which significantly speeds up the learning process.
  - Purpose a *constraint-guaranteed* strategy to limit the action space, which guides the agent to produce compressed networks that meet the constraints.
  - Under three specific compression rate on ResNet-50, our methods is 3x~800x faster than the three baseline methods.

- **Results:** Accpected by *IEEE Signal Processing Letters* (SCI-JCR-Q2) .

Dual-channel Feature Interaction Graph Convolutional Network Feb 2021 - Apr 2021

- **Background**: Graph convolution networks (GCNs) have a strong ability to express features in non-euclidean graph learning. Traditional graph convolution networks (GCNs) can't learn the node representation well when solving the problem of feature sparseness and topology sparseness, which exists in most datasets of real world networks. This work propose an end-to-end GCN framework to learn node representations in topology and feature space jointly.

- **Work and Contribution**:
  - Design node feature similarity matrix to construct the adjacency matrix of nodes on feature space.
  - Utilize the *Hilbert-Schmidt Independence Criterion (HSIC)* to enhance the disparity of learned embeddings.

- **Results**: Submitted to *INFORMATION SCIENCES* (SCI-Q1) and is under review.

Priority Prediction of Sighting Report Using Machine Learning Methods - First Author Feb 2021

- **Background**: The Asian hornet, as an alien species, has brought great damage to the ecology of North America. The government usually mobilizes citizens to submit nest sighting reports, and then strike out targeted exterminations to achieve high-efficiency prevention and control. However, given that most of the report submitters lack knowledge of the species and there are many false positives in the report, identifying high-confidence reports from the masses of sighting reports is crucial. Based on the migration mechanism and report content, we propose a report priority prediction model.

- **Work and Contribution**:
  - Design the Asian hornet's propagation model on the migration habits and Gaussian distribution assumption.
  - Predict the reliability of the report using Logistic Regression based on the well-designed features of sighting reports.
  - Quantify the confirmations between reports to determine the priority; Achive weighted accuracy of *83.5%*.

- **Results**: Finalist Winner (0.14%) in *2021MCM*, paper accpected by *SEAI 2021*

Neural Local Search for the Two-Echelon Vehicle Routing Problems - First Author Mar 2021 - Apr 2021

- **Background**: The Two-Echelon Vehicle Routing Problem with capacity constraints (2E-CVRP) is an important variant of the vehicle routing problem (VRP) in the family of combinatorial optimization problems. Classical algorithms based on local heuristics require trial-and-error iteration, which is time-consuming. Most of these methods use random selection of local operators. However, the operators are diversified in characteristics and have different improving effects on the current solution. How to speed up the search by optimizing the selection order of operators remains unsolved. This work proposes a RL-based Neural Local Search (NLS) to select local search operators more efficiently.
- **Work and Contribution**:
  - Model the improving decision process from repair solution to local optimal solution as an MDP.
  - Design the state embedding based on *attention mechanism* from three dimensions: Historical, Solution, and Problem.
  - Utilize policy gradient algorithm to train the purposed actor network.
  - Compared to the two SOTA methods, ours has a significant improvement (3.76%) in the *Hit Rate.*

PROJECT EXPERIENCE

Covid-19 Prediction Model based on Huber Regression and Hierarchical Feature - Leader   Oct 2020

- **Description:** In the COVID-19 prediction and evaluation competition at the 6th China Health Information Processing Conference, given the time series data and regional characteristic data of confirmed cases in three regions, we need to predict the confirmed cases for the next 7 days.
- **Work:**
  - Data cleaning for outliers; design a hierarchical classification feature coding scheme to encode the text information.
  - Conduct sufficient experiments to comprehensively compare the performance of multiple models.
  - Improve the model based on Huber Regression, which significantly reduces the sensitivity of model fitting to data outliers.
- **Results**: The championship of this track; Gave an oral presentation..

Bert-based Legal Judgment Document Amount Entity Extraction Model - Leader   Feb 2021

- **Description**: In actual legal business requirements, the extraction of the amount fields in the legal judgments document is usually done manually, which is time-consuming and labor-intensive. This project implements a BERT-based model for legal judgment amount entity extraction, enabling automatic extraction of ten types of amount entities.
- **Work**:
  - Design *"TF-IDF+Naive Bayes"* classification scheme for the preliminary screening of judgment texts and thus improve processing efficiency.
  - Initial screening of amount entities based on *Regular Expressions*; Construct classification feature based on context; Design "*BERT+ Logistic Regression*" scheme to complete the final prediction; Archive weighted accuracy of *93.5%.*
  - Package the algorithm as docker and deploy it on the server.
- **Results**: A software package delivered to Southern Big Data Co.,Ltd; A software copyright (being processed)

COMPETITION EXPERIENCE

Finalist Winner (0.14%) - 2021 American Mathematical Contest in Modeling	2021-04
Champion - The 6th China Health Information Processing Conference (Evaluation 4)	2020-11
Runner-up - National Undergraduate Software Practice and Innovation Ability Competition in 2020	2020-11
Top 0.4% - The 8th CCF Big Data and Computational Intelligence Competition (NLP Text Classification Track)	2020-12
Provincial First Prize - Contemporary Undergraduate Mathematical Contest in Modeling	2020-10
Provincial Second Prize - National Mathematics Competition for College Students	2020-10