

ZHANG Chuhan

EDUCATION

Beijing University of Posts and Telecommunications (BUPT)

09/2018-06/2022

Digital Media Technology | Bachelor | 85.54

Awards: The Third Price Scholarship 2019-2021

Core course: Advanced Mathematics, Linear Algebra, Algorithms and Data Structures, Computer Graphics, Computer Vision, Natural Language Understanding, Big Data Technology, Application Development of New Media

PUBLICATION

- ✧ Linmei Hu, Ziwang Zhao, **Chuhan Zhang**, Xuemeng Song, Liqiang Nie. MMNet: Improved Multimodal Fusion via Mutual learning Network for Fake News Detection, Annual Meeting of the Association for Computational Linguistics (ACL,2022), under review
- ✧ Linmei Hu, **Chuhan Zhang**, Siqi Wei, Bin Wu. A Survey on Fake News Detection: Techniques and Solutions, AI OPEN, will be submitted

RESEARCH

Research in the topic of Fake News Detection

04/2021-11/2021

Research led by Prof. Linmei Hu, BUPT

- ✧ Inspired by the cognitive understanding mechanism and proposed a novel multimodal fusion block to realize initial interaction and further fine-grained fusion between text modality and visual modality.
- ✧ Specifically, passed the keys and values from each modality as input to the other modality's multi-headed attention block to finish interaction between modalities.
- ✧ Proposed a mutual enhancement module to transfer learning experience between modules in a mutual learning manner and forced the two modules to imitate each other in the final predicted probabilities. Adopted Kullback Leibler (KL) divergence to indicate this process.
- ✧ Implemented with the textual and visual encoder part: employed the pre-trained BERT firstly, and adopted transformer encoder to further learn the representation of text. Adopted pre-trained multi-layer attention network to extract visual features after processing the image into discrete patches by linear projection.
- ✧ Conducted a comprehensive survey of fake news detection. Proposed a new taxonomy according to different features used by different methods. Presented a thorough overview and analysis of existing methods. Pointed out some future directions.

Domain-specific Knowledge Graph Construction and knowledge Services

05/2021-12/2021

Project led by Prof. Linmei Hu, BUPT

- ✧ Observed data characteristics and defined the ontology of the knowledge graph based on project requirements.
- ✧ Extracted knowledge instances like entities and relations respectively from text in unsupervised manner. Defined rules in accord with syntactic and semantic characteristics and obtained preliminary results to form annotated data sets. Trained the conditional random field (CRF) model on coarse dataset. Added the labeled data with high confidence into the data set to conduct iterative training of CRF.
- ✧ Extracted entities and relations jointly from text in supervised manner. Fed the labeled data to BERT-based models to identify entities. Constructed auxiliary sentences and filled entities to slots. Converted relation extraction into question answering tasks. Fine-tuned the BERT models.
- ✧ Adopted TransE for relation reasoning. Used a dissimilarity measure to define the energy of a given triple. Trained the model to learn the representations of KG entities and relations by minimizing a margin-based ranking objective that aims to score positive triples higher than negative triples based on their energies and a predefined margin.

Music and Lyrics Generation of Gongche Notation

02/2021-04/2021

Team leader

- ✧ Proposed the overall technical scheme, including the rule-based strategy for lyrics generation, deep learning based methods for music score generation, lyrics and music matching methods based on the hidden Markov model (HMM)
- ✧ Investigated existing sequence model. Preprocessed the gongche notation data by converting it between TXT data form, MIDI form, and music21 data stream form to enrich semantic information. Trained the music score generation model which is based on PyTorch, MIT music21, and fastai, called the model file, and generated gongche notation

music automatically

- ✧ Divided the matching of scores and lyrics into a coarse sentence match and fine-grained word match, both based on the hidden Markov model (HMM). Take sentence match for example: trained the HMM model by taking the corresponding time value of each sentence as a label and the words of lyrics in each sentence as the emitted words, identified the most likely probability and state sequence according to the trained parameters of HMM model and Viterbi algorithm.

The generated result of singable song can be heard at Himalaya (<http://m.ximalaya.com/sound/464972123>)

Implementation of A platform with Pushing Knowledge Independently Based on WeChat Applet 09/2020-12/2020

Team member

- ✧ Investigated audiences and made statistics on the types, patterns and structures of data information needed. Designed the database and built the underlying database through ER diagram and MySQL statement.
- ✧ Used Flask to operate MySQL database, transmitted corresponding data according to front-end requirements; and sent upload and download requests in WeChat mini program development environment, realizing data transmission among database, back-end and applet front-end.
- ✧ Established applet framework, called API, and designed a user-friendly interface, presenting the client-side visual effect.
- ✧ Implemented the clustering algorithm to support the “recommendation” function by classifying and matching different types of knowledge through tags, achieved the push of knowledge with similar tags.

An Automatic Poem Writing Program

04/2020

- ✧ Adopted Python to crawl ancient poems link based on regex module and get content based on BeautifulSoup module from ancient poetry websites. Stored them into corresponding data sets according to different poetry styles (euphemistic, bold, pastoral, etc.)
- ✧ Leveraged jieba library to analyze the word frequency of each type of poetry successively, and generated into the corresponding visual pictures with the words.
- ✧ Defined lyrics generation rules for different forms of poetry (five words and seven words) according to level and oblique tones, metres of poems, etc. Employed the Tkinter module to visualize the input and output interface, which is triggered by two buttons.

Design of Intelligent Wardrobe Based on Arduino

10/2019-01/2020

Team member

- ✧ Established Python, WeChat applet and related database, and sent data to hardware through Bluetooth module, achieving quantitative management of clothes data and automatic clothing fetching
- ✧ Adopted PCA algorithm and mobile terminal camera to recognize the clothes type, and realized automatic access by servo motor
- ✧ Modeled with Maya and 3D printed physical wardrobe
- ✧ Viewed the overall perspective of the clothes sample with the 3D pseudo-holographic pyramid model in the display terminal

COMPETITION ACHIEVEMENTS

- ✧ **The National Second Prize** of the Eleventh National Mathematics Contest for College Students 2019
- ✧ **The Second Prize** of the 4th BUPT “Young Wild Goose Plan” Competition and China International “Internet +” College Students Innovation and Entrepreneurship Competition Campus Competition 2019
- ✧ **National Silver Medal** of the “Internet + Express” College Students Innovation and Entrepreneurship Competition 2018

SKILLS

Programing skills: Python, Matlab, Java, Wechat applet

Software: Adobe Photoshop, Adobe After Effect, Maya, Steinberg Cubase

Hobbies: Piano (played 14 years & tenth level), photography, giving speech(Back to alma mater to promote BUPT for two consecutive years)