

ZHUBO DENG

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EDUCATION

University of California, Los Angeles

September 2018 - June 2020 (Expected)

Bachelor of Science in Mathematics of Computation

Relevant Coursework: Software Construction Laboratory, Artificial Intelligence, Machine Learning, Algorithms and Complexity, Linear Algebra Theory, Probability Theory, Computational Statistics with R programming

University of California, Los Angeles

September 2018 - June 2020 (Expected)

Bachelor of Arts in Linguistics and Computer Science

Relevant Coursework: Computational Linguistics, Linguistic Analysis, Applied Phonetics, Phonology, Syntax Theory, Linguistic Typology

De Anza College, Cupertino

September 2016 - June 2018

A.A. in Computer Science

Relevant Coursework: Data Abstraction and Structures, Assembly Language, Calculus, Differential Equations

RESEARCH EXPERIENCE

UCLA Natural Language Processing Lab

January 2019 - Present

Undergraduate Research Assistant, Advisor: Prof. Kai-Wei Chang

- Collect data and organize results on Reducing Gender Bias project
- Improve the algorithm and increase the interpretability of word embeddings
- Serve as an experimenter and a confederate in multiple experiments

PUBLICATIONS

Zhubo Deng, Weijia Shi, Pei Zhou, Muhao Chen and Kai-Wei Chang. Computational Analysis of French-origin Re-borrowing Process for English Loanwords. In *IEEE International Conference on Data Mining (ICDM) Workshop on Multilingual Cognitive Services (MLCS)*, 2019.

Abstract: Analyzing semantic change of loanwords over time between different languages has been a longstanding sociolinguistic problem. However, few efforts have been put to computational approaches to analyzing the semantics of loanwords. In this paper, we present a new computational method for detecting and tracking the semantic change of loanwords between two languages, specifically for the reborrowing process of loanwords. We trained our model on pre-trained historical bilingual English-French word embeddings aligned with MUSE and proposed two quantitative measures of detecting loanwords reborrowing. The first measure analyzes cosine similarity of one word from two languages in the same year, and it is sensitive to cultural shifts and lexicon reborrowing. The second measure analyzes Pearson correlation from the tendency of the cosine similarity and thus predicts the pattern of these reborrowing loanwords. We show that our model can detect reborrowing loanwords that have been discovered in literature.

RESEARCH PROJECTS

Learning to Represent Bilingual Dictionaries (in progress)

October 2019 - Present

- Fine-tune Bidirectional Encoder Representations from Transformers (BERT) model with bilingual dictionary input
- Minimize the semantic similarity of word-dictionary pairs from bilingual domain
- Build a model based on BERT that can align words and description properly
- Analyze the effect and the accuracy after fine-tuning the model
- Design and implement an algorithm for representing bilingual dictionary

Language Grounding of Communicative Learning

June 2019 - September 2019

- Implement referential game of multi-agent co-operative reinforcement learning to maximize a shared reward
- Train agents end-to-end and show that reinforcement learning agents can communicate with a raw pixel image input
- Implement loss function of partial order structure over the embedding to achieve a better performance
- Implement visual processing of images with a convolutional neural network (CNN)
- Implement a message encoder into dense representation and a decoder of a single layer LSTM

French-origin Reborrowing Process for English Loanwords Analysis

February 2019 - May 2019

- (paper accepted by ICDM Workshop 2019)
- Implemented Multilingual Unsupervised or Supervised word Embeddings (MUSE) model with bilingual corpus
- Aligned bilingual word embedding space using historical word embedding from two languages
- Designed an algorithm for tracking historical semantic change over a hundred year
- Detected English Loanwords from French and reborrowing patterns by cosine similarity and Pearson correlation

WORK EXPERIENCE

Space-Walker Inc., Shanghai

June 2018 - September 2018

Software Engineering Intern

- Improved the algorithm on computing and syncing cloud data after fetching and assembling them
- Developed a web page which represents the tracking information and real-time vehicle status
- Redesigned a more useful and simpler UI, and improved the interaction between users and the server

PROJECTS

Car Configuration Application

April 2018 - June 2018

- Developed an Object Oriented Application using encapsulation and serialization
- Created a framework for exposing a complex product and making the implementation extensible
- Wrote an API for Car Configuration Application and designed a Class Diagram
- Built a Client-Server model for multithreading in an Enterprise Class application
- Designed a User Interface for the end users to select and save car models

ACTIVITIES

De Anza Math Club

April 2017 - June 2018

- Co-founded De Anza Math Club
- Represented De Anza College to take part in the Math Competition
- Built relationship between students and professors to help them gain more resources
- Organized Math-related activities on campus

SKILLS

- Programming Languages: Python, TensorFlow, PyTorch, Java, C++, C, Git, Bash, HTML, CSS
- Foreign Languages: Mandarin (Native language), English (Fluent), Japanese (Intermediate), Korean (Intermediate), French (Intermediate)