

Yunyan Duan

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EDUCATION

Northwestern University

PhD candidate, Linguistics

Evanston, IL

Sep. 2015 – Dec. 2020 (expected)

- Research area: computational linguistics, psycholinguistics, reading, eye tracking

Peking University

Bachelor of Science, Statistics; Bachelor of Science, Psychology (Double degree)

Beijing, China

Jul. 2013

WORK EXPERIENCE

Tencent

Internship, Data scientist

Remote

Jul. – Aug. 2020

- Implemented text correction pipelines for Mandarin speech-to-text transcriptions, including language models and neural network models, and evaluated the performance of different approaches
- Analyzed common speech-to-text errors by annotating character-level and word-level errors, taking into consideration different genres, and summarized error patterns in language of phonetic rules
- Read research papers on text correction and summarized an in-depth report of this topic

Google

Internship, Analytical Linguist

Los Angeles, CA

Jun. – Sep. 2019

- Researched user-task interactions to identify meaningful signals predictive of the quality of crowd-sourcing labels
- Collaborated with software engineers and data scientists to design data processing pipeline
- Analyzed 100+ tasks with a wide variety of content, each task consisting of 10-200 questions and completed by 100-500 raters, to identify tracking events that predict label quality and consistency across raters
- Developed an R package and Python scripts to automatically query data from database, extract predictive metrics, visualize typical event trajectories, and generate an analytical report for every task
- Presented key findings to the team, which came into a product that impacts internal uses of crowd-sourcing labels

Kellogg School of Management, Northwestern University

Research Assistant

Evanston, IL

Aug. 2018 – Feb. 2019

- Part-time research assistant collaborated with professors to help data collection for research projects
- Wrote Python scripts to crawl sports competition results from 5 websites and organized the crawled data
- Wrote Python scripts to extract text data from pdf files and integrate datasets using fuzzy string matching

ACADEMIC JOURNAL PUBLICATIONS

1. Chang, W., **Duan, Y.**, Qian, J., Wu, F., Jiang, X., & Zhou, X. (2020). Gender interference in processing Chinese compound reflexive: Evidence from reading eye-tracking. *Language, Cognition and Neuroscience*. 1-16.
2. **Duan, Y.**, & Bicknell, K. (2019). A rational model of word skipping in reading: Ideal integration of visual and linguistic information. In *Proceedings of the 41th Annual Conference of the Cognitive Science Society*: 275-281. **Winner of best Computational Modeling paper in Perception & Action.**
3. **Duan, Y.**, & Bicknell, K. (2017). Refixations gather new visual information rationally. In *Proceedings of the 39th Annual Conference of the Cognitive Science Society*: 301-306.
4. Yu, H., **Duan, Y.**, & Zhou, X. (2017). Guilt in the eyes: Eye movement and physiological evidence for guilt-induced social avoidance. *Journal of Experimental Social Psychology*, 71, 128-137.
5. ***Duan, Y.**, & *Wu, O. (2016). Learning with auxiliary less-noisy labels. *IEEE Transactions on Neural Networks and Learning Systems*, 28(7), 1716-1721. (* indicates equal contributions.)
6. Luo, Y., **Duan, Y.**, & Zhou, X. (2015). Processing rhythmic pattern during Chinese sentence reading: an eye movement study. *Frontiers in Psychology*, 6, 1881.
7. Wang, L., **Duan, Y.**, Theeuwes, J., & Zhou, X. (2014). Reward breaks through the inhibitory region around attentional focus. *Journal of Vision*, 14(12):2, 1-7.

CONFERENCE PRESENTATIONS (EXCLUDING THOSE WITH PROCEEDINGS)

1. Sheng, Y., **Duan, Y.**, & Wu, F. Corpus-based Analysis of Complement Coercion in Mandarin Chinese. Poster presentation at the 25th annual conference on Architecture and Mechanisms for Language Processing (AMLaP), Moscow, Russia, 6-8 September 2019.
2. **Duan, Y.**, Berzak, Y., Bicknell, K., & Levy, R. Inferring sentence comprehension from eye movements in reading. Poster presentation at the 32nd annual CUNY Conference on Human Sentence Processing, University of Colorado, Boulder, Colorado, 29-31 March 2019.
3. **Duan, Y.**, & Bicknell, K. (2019). A rational model of word skipping in reading: ideal integration of visual and linguistic information. Poster presentation at the 32nd annual CUNY Conference on Human Sentence Processing, University of Colorado, Boulder, Colorado, 29-31 March 2019.
4. **Duan, Y.**, & Bicknell, K. (2016). Word identification in reading is constructive: Refixations seek new visual information. Poster presentation at the 22nd annual conference on Architecture and Mechanisms for Language Processing (AMLaP), Bilbao, Spain, 1-3 September 2016.
5. Hu, J., Liu, J., **Duan, Y.**, Zhao, C., Gong, X., Xiang, Y., Jiang, C., & Zhou, X. (2014). Resting-state functional connectivity indexes emotion recognition bias. Poster presentation at the 20th Annual Meeting of the Organization for Human Brain Mapping (OHBM), Hamburg, Germany, 8-12 June 2014.
6. **Duan, Y.**, Yu, H., & Zhou, X. (2014). Avoiding eyes reveals guilty heart: An eye movement study on interpersonal guilt. Poster presentation at the 6th Chinese International Conference on Eye Movements (CICEM), Beijing, China, 5-9 May 2014.
7. *Feng, W., ***Duan, Y.**, Luo, Y., & Zhou, X. (2013). When language hurts you: Aggression provoked by rhetorical questions. Poster presentation at the 1st Brain Research Symposium by PKU-IDG/McGovern Institute, Beijing, China, 20-21 August 2013.

RESEARCH PROJECTS

Rational models of eye movements in reading

Research Assistant at Department of Linguistics, Northwestern University, Evanston, IL

Sep. 2015 – present

- To understand how eye movement control and word identification work in reading, we use rational analysis with computational modeling to study how different sources of information (visual, linguistic, and contextual) act interactively to identify words and influence eye movement decisions.
- Techniques: *Bayesian inference, language models, reinforcement learning*

Inferring sentence comprehension from eye movements in reading

Visiting Student at Department of Brain and Cognitive Sciences, MIT, Cambridge, MA

Aug. 2018 – Dec. 2018

- Although psycholinguistic experiments suggest a strong eye-mind link, the evidence is mostly based on aggregated data. We predict readers' comprehension of individual sentences from their eye movements using machine learning and neural networks, and evaluate how well the predictive models generalize to new readers and new sentences.
- Techniques: *Machine learning, convolutional neural network (CNN), language models, model selection*

Natural language processing for predicting readmission in pediatric ICU

Research Assistant at Feinberg School of Medicine, Northwestern University, Chicago, IL

Sep. 2016 – Aug. 2017

- Useful information for predicting readmission after pediatric ICU hospitalization can come from electronic health records, especially social workers' notes. We formalize the idea by extracting text features from this unstructured data and implementing classifiers to predict readmission probability.
- Techniques: *Classification with unbalanced classes, natural language processing (bag-of-words model, sentiment analysis)*

Learning with auxiliary less-noisy labels

Research Intern at Institute of Automation, Chinese Academy of Sciences, Beijing, China

Apr. – Sep. 2014

- We propose a learning method that considers both noisy labels and auxiliary less-noisy labels available in a small portion of the training data. Our method outperforms traditional classifiers that do not explicitly consider the auxiliary less-noisy labels.
- Techniques: *Matlab, ExpectationMaximization algorithm, logistic regression, crowd-sourcing*

SKILLS

Programming languages: Proficient in Python, R, MATLAB; Intermediate in SQL, HTML/CSS

Machine learning: Supervised learning (e.g. classification, regression), unsupervised learning (e.g. clustering)

Natural language processing: Text analysis, sentiment analysis, neural network models

Python Packages & tools: Scikit-learn, Numpy, Pandas, NLTK, Stanford CoreNLP

Other computer skills: Git, command line, AWS (EC2)

Linguistics: Praat, IPA, phonetics and phonology, syntax, part-of-speech annotation, semantics

Statistics: Linear-mixed models, logistic regression, cluster analysis, Bayesian inference, etc.

ONLINE LEARNING

Coursera

<https://www.coursera.org/>

*Certificate: **Reinforcement Learning Specialization***

Mar. 2020

- Learned the space of RL algorithms, how to build a RL system for sequential decision making, how to formalize a task as a Reinforcement Learning problem, and how to begin implementing a solution.

Coursera

<https://www.coursera.org/>

*Certificate: **Deep Learning Specialization***

Nov. 2018

- Through 5 courses, developed a profound knowledge of deep learning from its foundations (neural networks) to its advanced techniques and industry applications (convolutional neural networks, recurrent neural networks, etc.).

Stanford Online

<https://lagunita.stanford.edu/>

*Statement of Accomplishment: **Mining Massive Datasets***

Jul. 2017

- This course covers “big-data” algorithms, including PageRank, stream algorithms, clustering, social-network graph analysis, large-scale machine learning, recommendation systems, computational advertising, etc.

AWARDS & FELLOWSHIPS

Successful Participants of Mathematical Contest in Modeling (MCM), 2013

First-class Award in Beijing district in China Undergraduate Mathematical Contest in Modeling, 2011

Hui-Chun Chin and Tsung-Dao Lee Chinese Undergraduate Research Endowment (CURE), 2011

Second-class Freshman Scholarship, Peking University, 2009

PART-TIME PROJECTS

My personal Github page: <https://yyd27.github.io/>

Individual contributor

Since Apr. 2017

- Build and maintain a personal website using Jekyll
- Share blog posts sometimes

Architecture highlights in Shanghai

Shanghai library open data challenge

Team lead

May – Aug. 2019

- Led a team of 7 to develop a website featuring architectures of historical importance in Shanghai
- Developed back-end code (implemented in Python/Django) to categorize architectures based on text descriptions
- Managed weekly updates, participated in discussion of product design, and prepared final presentation

Word evolution in ancient Chinese poems

Shanghai library open data challenge

Individual contributor

May – Aug. 2018

- Developed a website aiming to help researchers gain insights into word evolution, style change, and social evolution reflected in ancient Chinese poems over hundreds of years
- Independently came up with the idea, designed features, developed applications, and wrote documentation
- Implemented website using Python/Django and visualized data patterns using R Shiny