Nathaniel Carlson

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EDUCATION

Brigham Young University **Dec 2022**
BS, Mathematics *Provo, UT*
Minor in Computer Science

- BYU Academic Scholarship
- **Relevant Course Work** – Real Analysis, Deep Learning, Algorithm Design and Optimization, Statistical Machine Learning, Data Structures & Algorithms, Machine Translation, Natural Language Processing

RESEARCH EXPERIENCE

BYU DRAGN Labs (https://dragn.ai/) **Mar 2020-Present**
NLP Research Assistant; Advisor: Dr. Nancy Fulda *Provo, UT*

- Applying contrastive learning to learn fixed length phonological representations of words from articulatory features
- Coauthored paper on weighted target/context combinations of static word embeddings (Accepted to NEJLT)
- Supervised training, hyperparameter tuning, and downstream evaluation of **126** sets of word embeddings
- Investigating potential of large language models to act as proxy survey participants and aid in survey development
- Led development of a neural machine translation model for culturally aware translation
- Presented work at BYU Student Research Conference and won best presentation at Data Science Session

Air Force Research Laboratory **May 2021-Sep 2021**
Machine Learning Research Intern; Advisor: Dr. Oliver Nina *Dayton, OH (Remote due to COVID-19)*

- Led team of interns in developing novel self-supervised algorithm for learning features from unlabeled image data
- Presented findings and results of research to **100+** other interns and Air Force leadership
- Assisted in design and implementation of two key algorithms in our method:
  - k-means negative sampling **(+1.7%** Image Net classification accuracy)
  - nearest neighbors swapped prediction using feature queue **(+0.7%** classification accuracy)
- Implemented several deep learning papers in PyTorch

PEER-REVIEWED PUBLICATIONS

Nathaniel Robinson, **Nathaniel Carlson**, David Mortensen, Elizabeth Vargas, Thomas Fackrell, and Nancy Fulda. Task-dependent optimal weight combinations for static embeddings. *Northern European Journal of Language Technology*, 8(1), 2022

PRESENTATIONS

"Task Dependent Optimal Weight Combinations for Static Word Embeddings"
Nathaniel Carlson
Brigham Young University CPMS Student Research Conference, 2022

"Unsupervised Representation Learning via Self Distillation"
Nathaniel Carlson, Sahil Jahin, Matt Spataro
Autonmy Technology Research Center (ATRC) Summer Review, 2021

"Beyond Target and Context: Embedding Combinations Reveal Patterns Across Algorithms and NLP Tasks"
Nathaniel Robinson, **Nathaniel Carlson**, Elizabeth Vargas
Brigham Young University CPMS Student Research Conference, 2021 (*Awarded Best Presentation in Session)*

RELATED PROFESSIONAL EXPERIENCE

CVS Health **Jun 2022-Aug 2022**

Data Science Intern; Advisor: Jin Liu *New York City, NY (Remote due to COVID-19)*

- Wrote efficient SQL pipeline in Hive to summarize health information from **1M+** patients into predictive features
- Built LightGBM model to predict inpatient hospitalization in oncology patients, achieved **89%** test set accuracy
- Leveraged resampling techniques to correct training set class imbalance and improve test set recall by **~60%**
- Summarized findings into actionable business insights and presented to analytics management and fellow interns

LEADERSHIP/VOLUNTEER

BYU Concessions **Oct 2022-Present**

Data Science Consultant *Provo, UT*

- Cleaned and analyzed sales data from university sporting events to make supply chain recommendations

BYU Data Science Club **Aug 2020-Present**

Club Leadership *Provo, UT*

- Organized data analytics hackathon for club members
- Mentored younger students in revising resumes and applying for internships

RELEVANT SKILLS

- **Proficient** – Python, Java, C++, Deep Learning, SQL, Mandarin Chinese (Intermediate Proficiency)
- **Areas of Experience** –NLP, Machine Translation, Statistics, Computer Vision