

# Matthew Whitehead, Ph.D.

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**Tenured Associate Professor with a Ph.D. in Computer Science focused on machine learning and data science.**

Specializing in applied machine learning including applications in natural language processing, reinforcement learning, sentiment mining, recommendation systems, computer vision, clustering, and explainable ANNs.

Looking for a position where I can help build real-world ML systems and/or use ML to analyze large datasets for patterns and insights.

## Employment

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- **Colorado College** **Colorado Springs, Colorado**  
*Assistant Professor/Tenured Associate Professor/Co-Chair,* *Fall 2010 - Present*
  - Researching in applied machine learning.
  - Teaching across the undergraduate CS curriculum.
  - College and departmental leadership including mentoring junior faculty members.
  - Mentoring students in research experiences and software engineering projects.
- **Google, Inc.** **New York, New York**  
*Ph.D. Intern* *Summer 2009*
  - Speech and voice search for Android.
- **Apple, Inc.** **Cupertino, California**  
*Ph.D. Intern* *Summer 2008*
  - iPhone handwriting recognition for Chinese character input.
- **Tellme Networks, Inc.** **Mountain View, California**  
*Ph.D. Intern* *Summer 2007*
  - Natural language processing and sentiment mining for applications in voice search.
- **Indiana University** **Bloomington, Indiana**  
*Database Engineer* *Summer 2006*
  - Designed and implemented an online academic admissions database using SQL and PHP.

## Education

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- **Indiana University** **Bloomington, Indiana**  
*Ph.D. Computer Science,* *2010*
- **Washington State University** **Pullman, Washington**  
*M.S. Computer Science,* *2004*
- **Willamette University** **Salem, Oregon**  
*B.S. Mathematics,* *2001*

## Selected Research Projects

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- **Observational Neural Networks (2019-Present)**

Designing neural networks that observe the learning processes of other neural networks. Observers can then be used for explanation, optimization, or solving algorithmic problems.

- **Function-Calling Neural Networks (2018-Present)**

Creating attention-based models that leverage existing libraries of software functions to solve algorithmic problems more efficiently and in a more explainable way.

- **Visualizing and Analyzing Patents Using Word Embeddings (2015-2017)**

Used word2vec word embeddings to create new measures of patent value, including creativity and breadth. Created a visualization tool for guided patent search of cancer-related patents. Work received an honorable mention from the USPTO's Cancer Moonshot competition.

- **Deep Reinforcement Learning in a 3-D Environment (2015-2017)**

Built a DQN framework that allows reinforcement learning agents to gain environmental spatial knowledge through 3-D visual processing. Trained agents on a number of behavior tasks of varying degrees of complexity in a 3-D virtual environment.

- **Visualizing Language Learning with Deep ANNs (2015-2016)**

Worked with deep stacked autoencoders to understand some of the learned semantics when processing natural language text. Created a tool for word cloud visualizations with still images and animations to help researchers understand what deep networks have learned from processing text.

- **Ensemble Machine Learning (2007-2012)**

Worked on building machine learning ensembles using dataset pre-clustering so component models could focus on specialization or generalization and be more easily parallelizable than boosting.

- **Sentiment/Opinion Mining (2007-2008)**

Designed and built systems for automatically determining sentiment or opinion present in text reviews found online. Researched the effectiveness of monolithic vs. transfer learning systems when determining text sentiment from a variety of sources, such as movie reviews, restaurant reviews, physician reviews, and others.

- **Collaborative Filtering and Recommendation Engines (2006-2007)**

Researched combining multiple collaborative filtering methods together to create ensemble models that greatly surpass any of the individual methods.

## Technical and Personal skills

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- **Programming Languages:** I primarily work in Python and Java, but also have experience with C, MATLAB/Octave, R, Scheme, and Javascript.
- **Machine Learning Frameworks:** Keras/Tensorflow, PyTorch, scikit-learn
- **Other Software Frameworks/Libraries:** numpy/scipy, SQL (MySQL, SQLite), openCV, nltk, word2vec
- **Presentation Skills:** Well-developed oral presentation skills, especially when speaking to audiences with mixed backgrounds.
- **Technical Writing:** Strong writing skills, including formal scientific and technical writing. Published academic author with papers on machine learning, NLP, sentiment mining, and reinforcement learning.
- **Mentoring Experience:** Extensive background (12+ years) mentoring beginning computer scientists in programming, research, and theory.