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

- **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

- **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

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

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

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

  Using transformers to create 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

- **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.