David Black

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• Over 5 years' experience in cutting-edge machine-learning research for automated handwriting & speech recognition (1 patent)
• 11+ years' experience in computational research & software design
• 2 years' experience teaching at a post-secondary level
• At least 6 months' experience in each of the following roles: Oversight of data flow & preliminary manipulation at a particle accelerator; Simulation of physical processes to compare with particle-collision data (27 publications); Programming the underlying shape-detection algorithms for Asian-language transcriptions; Volunteer work with Dr. Ryan Farrell (BYU) in computer vision;
• My research experience in computation analysis, data curation, data annotation, software development/QA, and mathematical modeling has prepared me to bring innovative approaches to solving software-based problems applicable to a wide range of machine-learning tasks. I have analyzed data to detect and prognosticate system problems in ML algorithms. I have analyzed the priority of improvements to be made. I have debugged and helped to write programs in a variety of programming languages for both machine learning and information system tasks. My broad range of interests and ability to quickly learn new concepts, models, and software set me apart to be an exceptionally productive team member in a variety of Machine Learning, Artificial Intelligence, and Data Science roles.

Work Experience

Speech Sciences and Machine Learning Researcher, AI Labs Team Member

CaptionCall/Sorensen Communications - Salt Lake City, UT
June 2018 to Present

» As part of the original team, helped set priorities, determine direction, choose tools, & collaborate closely with the other original team members.

» Initially conducted substantial literature review & decided implementation of findings || Python, scikit-learn, NumPy, SciPy, matplotlib, NIST's sclite, kaldi

» Taught other members of the team to use Cygwin® as our Linux-type implementation; this involved debugging & adapting package builds & software || bash, C, C++, make, CMake, Perl

» Automated scoring || wrote Python wrapper for NIST's sclite executable

» Normalization of different human & machine transcribers' output so as to have only words as pronounced || extensive use of sed, awk, grep, & Perl in development; implementation included NIST's rfliter1 with additional regexes & customized algorithms

» Designed, developed, distributed, & maintained the normalization tool as a Python package || setuptools, pip

» Communication with management & pass-offs to engineering with the normalization software || C#, Microsoft Visual Studio & Azure DevOps

» Performed dataset management for purchased, open-source, & created datasets || sed, awk, grep, find, vox, ffmpeg, mediainfo

» For the creation & curation of new datasets, used customized hardware, call-recording software – implemented by a German freelancer, & experimental design || Python, Twilio, Amazon Elastic Beanstalk, AWS NoSQL

» Silence detection & removal to allow more words per unit time, implementing HMM & SVM models || pyAudioAnalysis

» Iterative break testing for changes in the normalization software; used my knowledge of the intricacies of language & its representation along my significant experience to create robust testing material

» Solved the majority of file encoding & decoding issues for text & audio files

» Participated in a recent broadening of ML tools based on speech; attended informational and demo meetings, particularly concerning end-to-end, real-time ASR & concerning conversation summarization along with question answering using transformers

Document Specialist

Granite Mountain Records Vault, Church of Jesus Christ of Latter-day Saints, Church History Department - Salt Lake City, UT
August 2017 to May 2018

» Digitized of thousands of family-history-related images from microfilm documents; work included: image analysis and processing; image manipulation to ensure readability and quality assurance; work done using proprietary software in view of making the images publicly available

» Served as a paleography (handwriting recognition through different time periods) and language-recognition resource for other workers due to expertise in these areas

» Viewed a wide variety of documents and kept notes; focused on what could help or hinder automatic information extraction, i.e. that done with Machine Learning

Data Scientist & Metadata Research Specialist 3 - Contractor

FamilySearch International - Salt Lake City, UT
July 2016 to July 2017

• Found, prepared, and analyzed records and their annotations for the Advanced Research Team
• Helped with many projects, but especially with handwriting recognition which leverages the kaldi speech recognition toolkit as an underlying analysis framework
• Allowed important reduction of ground truth data creation time
• Generally discussed and developed algorithms and analyzed data patterns with the research team

» Data Curation || found document images, reviewed and selected data for collections - particularly a corpus of ~20k documents in 12 languages that cover patron demand || quickly found various data for unforeseen research needs, often focusing on potentially difficult images

» Data Annotation || Mined data from a main, large database to use in simplifying memory and computational needs || Vetted and annotated difficult documents using my expertise in linguistics, and machine learning || Created annotation tools described below

» Software Design in Java || transcription || image segmentation || segment identification and classification || relationship mapping || design led to a major acceleration of zoning & classification tasks

» As-Needed Script and Terminal Tools in bash & Python || created logging for annotation history || tested for: encoding compatibility; annotation validity; degree of task completion || found files whose annotation had been missed, left incomplete, or corrupted, then worked to fix them

» Data Representation || Provided conversion between the more-technical format of data representation needed by the research time and the layman's version of data which could be easily annotated by volunteers

» Software Evaluation || personally wrote code to incorporate a vendor's Asian-Language OCR (Optical Character Recognition, i.e. automated transcription) API || used and incorporated Java, Java Native Interfaces, C++ || Scored performance for comparison to other products using NIST scoring tools - sclite

» Worked with contemporary and historical maps, gazetteers, and place names from records, all in conjunction with record finding as well as helping people revive old memories.

Substitute Teacher K-12

Granite School District, Salt Lake County - South Salt Lake, UT
February 2016 to May 2016

Acted as a qualified substitute teacher for in-demand subjects such as physics, mathematics, general science, computer programming, etc. Helped students in language immersion classes using my fluency in both French and Spanish.

Assistant Professor

Snow College - Ephraim, UT
August 2014 to December 2015

» Planned & taught courses in: remedial math; college algebra; physical science – including astronomy, Earth science, chemistry, physics; & college physics
» Physical science courses were taught simultaneously as on-campus & distance-learning courses
» Focused on technology in the classroom; encouraged students to use Wolfram Alpha to learn concepts & check answers; created simulations of physical processes, notably of Solar System formation from randomly-placed particles, which students could run multiple times - written in Adobe Flash ActionScript (similar to JavaScript)

FedEx Package Handler

FedEx Ground - North Salt Lake, UT
November 2013 to July 2014

Checked, loaded, and unloaded boxes from semi truck beds. Worked with a small group of deaf/hard-of-hearing individuals using the French Sign Language I had learned, earlier.

Education

Master of Science in Physics
University of California-Riverside - Riverside, CA
September 2010 to October 2013

Bachelor of Science in Physics
Brigham Young University-Provo - Provo, UT
September 2004 to August 2010

Skills

- Keras
- Agile
- Shell Scripting
- DHTML
- Perl
- C/C++
- PostgreSQL
- Machine learning
- PHP
- Bash
- Linux
- MATLAB
- Git
- JavaScript
- Python
- Data science
- Natural language processing
- Mathematica
- Scripting
- TensorFlow
- SSH
- Java
- Presentation skills
- Communication skills
- Technical writing
- Research laboratory experience
- Research

- Big data
- Data mining
- Data modeling
- Data management
- Family History Research
- Math
- Windows
- Microsoft Office
- Teaching
- Training & development
- Analysis skills
- Linguistics
- Data collection
- Data annotation
- Leadership
- Software development
- Paleography & Codicology
- French
- Spanish
- Russian
- German
- Latin
- Greek
- Hebrew
- Arabic
- American Sign Language
- English
- Data visualization
- AWS
- Azure
- Creativity
- Mac OS
- Selenium
- XML
- Programming Documentation

Languages

- English - Fluent
- French - Fluent

- Spanish - Expert
- Russian - Intermediate
- German - Beginner
- Latin - Beginner
- Greek - Beginner
- Hebrew - Beginner
- American Sign Language - Intermediate

Links

http://linkedin.com/in/thedavidwblack

http://stackexchange.com/users/8693193

https://github.com/bballdave025

https://www.bballdave025.com

Patents

Switching Between Speech Recognition Systems (#11017778)

May 2021

Abstract: A method may include obtaining first audio data originating at a first device sharing a communication session between the first device and a second device. The method may also include obtaining an availability of revoiced transcription units in a transcription system and in response to establishment of the communication session, selecting, based on the availability of revoiced transcription units, a revoiced transcription unit instead of a non-revoiced transcription unit to generate a transcript of the first audio data. The method may also include obtaining revoiced audio generated by a revoicing of the first audio data by a captioning assistant and generating a transcription of the revoiced audio using an automatic speech recognition system. The method may further include in response to selecting the revoiced transcription unit, directing the transcription of the revoiced audio to the second device as the transcript of the first audio data.

Additional Information

One of five inventors.