CURRICULUM VITAE

Ben Alexander

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EDUCATION

2021 – present	**M.S.**, Computer Science, Stanford University, Stanford, CA
2016 – 2020	**B.S.**, Statistical Science, Duke University, Durham, NC
2016 – 2020	**B.A.**, Computer Science, Duke University, Durham, NC GPA: 4.0/4.0

HONORS & AWARDS

May 2020	**Summa Cum Laude**, Duke University
May 2019	**Phi Beta Kappa**, Duke University
Fall 2019	**Invited Judge for Duke Datathon** – Invited to serve as the only student representative on the judging panel for Duke Datathon, a large data analysis competition (300+ students).
2016-2020	**Dean's List, with Distinction**, Duke University (all semesters)

PUBLICATIONS/PATENTS

1. **Alexander, B.**, Nallathambi, G., and Selvaraj, N. (2018). "Screening of Heart Sounds Using Hidden Markov and Gammatone Filterbank Models." *17th IEEE International Conference on Machine Learning and Applications (ICMLA)*. 1460-1465. 10.1109/ICMLA.2018.00237.

2. Hu, W., **Alexander, B.**, Bradbury, K., Cathcart, W., Hu, A., Nair, V., and Zuo, L. "Mapping Electric Transmission Line Infrastructure from Aerial Imagery with Deep Learning." *2020 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*.

3. PCT patent application (PCT/US19/50207) and non-provisional patent application (16/564,796). "Screening Device, Method, and System for Structural Heart Disease." G. Nallathambi, **B. Alexander**, and N. Selvaraj. Filed September 19, 2019.

PROFESSIONAL EXPERIENCE

May – Aug. 2021 **Software Development Engineer Intern – Amazon, Alexa**
– Helped the Automatic Speech Recognition (ASR) organization move from hybrid to all-neural speech recognition model.
– Improved ML model infrastructure to greatly speed up the model customization process (approximately 5x for certain model customizations), and to make it significantly less error prone.

May – Aug. 2019 **Computer Vision Intern – RADAR**
– Helped develop deep learning models to improve computer vision systems for in-store analytics at RADAR, a NYC-based retail technology company.
– Designed an end-to-end process for training models to perform "person re-identification" in video footage using PyTorch.
– Collected training footage from in-house studio, researched and built person re-identification models, and stress-tested models to identify weaknesses.

May – Sept. 2018 **Machine Learning/Data Analyst Intern – VitalConnect, Inc.**
– Researched and employed predictive analytics at a Silicon Valley innovator of wearable biosensor technology.
– Designed machine learning algorithm that automatically detects abnormal heart sounds from raw, unstructured audio recordings with high accuracy.
– Published conference paper (presented at 2018 IEEE ICMLA conference).
– Algorithm incorporated into PCT patent and non-provisional patent applications (filed September 2019).

May – June 2017 **Technology Systems Intern – Ruane, Cunniff & Goldfarb**
– Strategized with Information Technology team to transfer customer information to new database management system.
– Helped generate solutions to roadblocks during daily meetings between C.O.O. and I.T. team.
– Performed data cleaning, database record linkage, and database information retrieval (SQL).

ACADEMIC/TEACHING EXPERIENCE

Teaching assistant:

Fall 2019 **STA 325: Machine Learning & Data Mining**, Duke University
– Helped students learn about machine learning and data mining algorithms such as decision trees and forests, SVMs, nonlinear regression, dimensionality reduction, clustering, model selection, cross-validation, and other topics.
– Held office hours, wrote practice problems, and graded assignments.

Fall 2018 **STA 523: Statistical Computing (PhD-level)**, Duke University

– Helped students improve their understanding of R, Git, web scraping, data wrangling, text manipulation, interactive web apps, and data visualization.

Spring 2018 **CS 101: Intro to Computer Science**, Duke University
– Helped students learn to code in Python by holding office hours and leading recitation.

Spring/Fall 2017 **MATH 122L: Calculus II with Applications**, Duke University
– Helped students learn Calculus II by holding office hours and leading recitation.

Other research experience:

Sep. 2020 - May 2021 **Stanford University – Natural Language Processing**
– Hazy Research Group (Prof. Chris Ré)
– Helped contribute to a BERT-based entity disambiguation/linking system that improves performance on entities that are rare or not seen during training. Worked on weak supervision techniques for training on unlabeled data, and incorporating embeddings into downstream tasks.

Summer 2020 **Optimization Toolbox for Reopening after COVID-19**
– With Prof. Vincent Conitzer and Prof. Debmalya Panigrahi.
– Designed optimization toolbox that provides automated tools for solving logistical challenges related to reopening labs, offices, etc. after COVID-19 restrictions are relaxed.
– Examples include designing floorpans that avoid close contact, partitioning employees into smaller teams/shifts to maximize value and minimize risk, and optimizing desk usage to limit viral transmission.

2018 - 2019 **Duke University, Energy Data Analytics Lab**
– Researched deep learning methods for automatically identifying energy infrastructure in satellite imagery. Trained deep learning-based object detection models, including Faster-RCNN and RetinaNet.
– Researched model generalizability across different geographies and image resolutions, to inform future work.
– Poster placed 2nd (tied) at the 2019 Duke Research Computing Symposium.
– Paper accepted to the 2020 IEEE International Geoscience and Remote Sensing Symposium (IGARSS).

RELEVANT COURSEWORK

– **Stanford**: Machine Learning with Graphs (CS224W), Principles of Robot Autonomy (CS237A), Machine Learning on Embedded Systems (EE292D).

– **Duke**: Machine Learning (CS 671D), Bayesian and Modern Statistics (STA 360/602), Machine Learning & Data Mining (STA 325), Case Studies in Statistics (STA 440), Intro to Artificial Intelligence (CS 270), Probability (STA 230), Regression Analysis (STA 210), Data Structures & Algorithms (CS 201), Linear Algebra (MATH 218), Design & Analysis of Algorithms (CS 330), Computer Architecture (CS 250), Database Systems (CS 316), and Statistical Computing[1] (STA 323/523), among others.

VOLUNTEER WORK

Co-President – Duke University Habitat for Humanity (2018-2020)

– Worked closely with Durham Habitat for Humanity to build a Duke-sponsored house from start-to-finish each year. Scheduled and attended builds on Saturday mornings, publicized events, and performed outreach.

PROFESSIONAL AND COMPUTING SKILLS

Programming languages: Python, R, Java, C, SQL.
Data: PyTorch, NumPy, scikit-learn, pandas, matplotlib
Other: Flask, LaTeX, Git

[1] Later served as a TA for the PhD-level version of this course (STA 523)