Reed Hodges
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Professional Summary

Scientist with a strong background in physics and mathematics, with experience in building mathematical models, analyzing large datasets, and presenting findings. Nine years of experience in research, programming, and collaborative project management.

Technical Skills

Languages: Python, SQL (MySQL), R, JavaScript, HTML, CSS, Fortran, Mathematica, MATLAB
Libraries: Pandas/Spark, NumPy, scikit-learn, PyTorch
Tools: AWS, Git, GitHub
Others: Linux/Unix, Bash, Machine Learning, Deep Learning, Data Analysis, Data Visualization

Experience

Research Assistant | *Duke University, September 2018 – Present*

- Analyzed large datasets from nuclear physics experiments using Python for use in theoretical modeling
- Encouraged transparency and reproducibility while managing the codebases on GitHub for 4 research projects
- Derived over 30 new probability density functions to explain a wide range of data from particle colliders, enabling the community at large to use the functions in other research projects
- Reduced runtimes from minutes to seconds by fine-tuning programs for symbolic and numerical computation in Mathematica
- Delivered oral research presentations at national and international seminars and conferences, communicating the methodology, results, and applications of research to both expert and non-expert audiences
- Co-authored 4 academic papers, playing a leading role in literature review, analysis, writing, and presentation
- Formulated a new model to predict the lifetime of a newly discovered particle with 98% accuracy, showing the validity of our model compared to competing models; earned the Goshaw Family Endowment in recognition of this work

Research Assistant | *Georgia Southern University, September 2015 – May 2018*

- Utilized parallel computing in Fortran and Mathematica to reduce runtimes by a factor of 16 for programs that modeled materials to better understand how they interact with light
- Used iterative testing and optimization techniques to identify a new design for a micrometer-sized material with near-invisibility when exposed to lasers, reducing light scattering by over a factor of 10
- Collaborated with interdisciplinary teams to translate complex scientific concepts into accessible presentations, which were delivered regional and national conferences

High Performance Computing Intern | *Shodor Education Foundation, June 2016 – June 2017*

- Enabled more complex simulations and reduced project timelines by developing Fortran programs for modeling the electromagnetic properties of small objects, achieving runtimes over 300 times faster than existing code
- Transitioned the computation in my undergraduate research to utilize parallelization on GPUs

Selected Projects

Data analysis of a simulated sports league | *Python, SQL, Tableau*

- Designed a sports statistics project to simulate games, analyze player performance, and visualize data trends
- Developed a Python program utilizing object-oriented programing and incorporating realistic game statistics to generate a detailed dataset for analysis
- Implemented SQL queries for data manipulation and extraction of key metrics
- Visualized trends using a Tableau story

Infection Simulator web application | *JavaScript, Python*

- Designed and hosted a simple interactive web application on Heroku using JavaScript for the frontend and Python (Flask) for the backend, simulating an infectious disease spreading through a community
- Users can adjust various parameters, such as inoculation rate, mortality rate, and number of individuals to see their effects on transmission

Employment trends in North Carolina, 1990–2022 | *R, Statistics, Hypothesis Testing, Data Visualization*

- Conducted an analysis of employment trends in North Carolina, utilizing statistical tests including analysis of variance (ANOVA), focusing on industry sectors, ownership types, and wage disparities
- Showed a statistically significant discrepancy in wages by ownership type, with federal government positions tending to have the highest pay
- Demonstrated that the Agriculture, Forestry, Fishing, and Hunting industry has seasonal variations in employment that favor the third quarter of the year
- Created visualizations to demonstrate trends, using R packages like ggplot2 and dplyr

Education

PhD in Physics | Duke University, May 2024 | GPA: 3.86/4.00
BS in Physics, minor in Mathematics | Georgia Southern University, May 2018 | GPA: 4.00/4.00