ANAND I. JAIN

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EDUCATION

University of Chicago **2017-2020**
Computer Science

Courses: •Abstract Linear Algebra (MATH 20250) •Theory of Algorithms (CMSC 27200) •Computer Systems (CMSC 15400) •Discrete Mathematics (CMSC 27100) •Electronics (PHYS 22600) •Inventing Interactive Devices (CMSC 23220) •Mathematical Logic (CMSC27700) •Quantum Computation (MENG 23700)

EXPERIENCE

Research Programmer, JuliaHub Inc. **Apr 2021 - July 2023**

- Implemented parsers for the CellML (CellMLToolkit.jl), Systems Biology Markup Language (SBML) (SBMLToolkit.jl), and MathML (MathML.jl) specifications in the Julia programming language.
- Automated simulation of ~2000 ODE models on the BioModels.org database for performance tracking and specification compliance (`github.com/anandijain/BioModelsAnalysis.jl`)
- Worked with pharma clients to translate MATLAB models to Julia for improved performance.

Large Synoptic Survey Telescope Machine Learning Intern, Fermilab **June - Aug 2019**

- Researched the applications of neural differential equations in astronomy for the LSST.
- Used the PLAsTiCC Astronomical Kaggle dataset to train a neural network to approximate the differential equation of different astronomical objects' light curves (brightness over time)
- Presented poster of my work on Neural-ODEs at 2019 LSST Conference in Arizona
- Source code: `github.com/deepskies/cosmoNODE` - Private

PROJECTS

cas3.rs - Implementing Mathematica in the Rust Language **200 Hours Sept-Oct 2023**

- Wrote the core pattern matcher, parser, and evaluator of Mathematica in Rust.
- Cas3 can reduce S-K combinator system expressions, simulate cellular automata, and calculate symbolic derivatives.
- Source code: `github.com/anandijain/cas3.rs` Video development: `https://youtube.com/playlist?list=PL79kqjVnD2EOBvsTiCQqX0ZAwx9AKiA_w&si=emn0HZQEnS98zd4m`

Building a modular synthesizer from scratch **300 Hours Dec 2023-Feb 2024**

- Used kicad to implement a square and sine-wave voltage controlled oscillator, dual power supply (+-9V), a transistor amplifier, envelope generator, and voltage controlled low-pass filter.
- Used the toner-transfer method to fabricate double sided through-hole PCBs of above modules.
- Source code: `github.com/anandijain/synth.kicad` Video development: `https://youtube.com/playlist?list=PL79kqjVnD2ENdJDDSTUD3ZMdZPhVVu8yw&si=TNAEGmvNShpb-L0L`

Free2Pee - Free bathroom locator website in Rust and Leptos **75 Hours Feb-Sept 2023**

- Website hosted on GitHub Pages that uses the OpenStreetMap database to find nearby bathrooms, then uses an open-source API to determine distance to the user, returning a table of all nearby bathrooms, metadata, and distance.
- Compiling to WebAssembly makes the website hostable statically and serverless.
- Source code: `https://github.com/free2pee/free2pee`
- Website: `https://free2pee.github.io/free2pee/`

AILeetcode - Evaluating GPT-3.5 on every LeetCode coding question **75 Hours Jun-Aug 2023**

- Created a dataset of ~40000 OpenAI GPT completions (~2000 questions x 20 languages) to study the quality of code generation of LLMs across languages
- Submitted answers generated by GPT to LeetCode by reverse engineering LeetCode's REST API - got into top 3000 rank in LeetCode
- Source code: `https://github.com/anandijain/leetcode_evals`

Music generation with Variational-Autoencoders (VAE) in Pytorch **30 Hours Jan-Feb 2020**

- Trained a VAE to find a low dimensional representation of sound segments 1-3 seconds in length
- Source code: `https://github.com/anandijain/sippyart`.
- Music Outputs: `https://anonstandardunitofmeasurement.bandcamp.com/album/vae`

PUBLICATIONS

Lang, P. F., Jain, A., & Rackauckas, C. (2024). SBMLToolkit.jl: A Julia package for importing SBML into the SciML ecosystem. *Journal of Integrative Bioinformatics*. doi:10.1515/jib-2024-0003

Rackauckas, C., Anantharaman, R., Edelman, A., Gowda, S., Gwozdz, M., Jain, A., Laughman, C., Ma, Y., Martinuzzi, F., Pal, A., Rajput, U., Saba, E., & Shah, V. B. (2021). Composing Modeling and Simulation with Machine Learning in Julia. *arXiv:2105.05946*. Retrieved from arXiv:2105.05946

SKILLS

Rust, Python, Julia, C, Kicad, Git, Continuous Integration, High-performance modeling and simulation of differential equations, Deep learning, MATLAB, Autodesk Fusion, Ableton Live