Enrico Zandomeni Borba

Education

California Institute of Technology (2019)
B.S. Computer Science – Machine Learning Track

Contact

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Work Experience

Higher Order Company · Senior SWE [Rust, C, Haskell, Agda, CUDA, HVM]   (Jan 2024 - Present)
Helped create HVM2/3 – The fastest symmetric interaction combinator runtime. Designed and implemented IO features for HVM's CUDA runtime. This is being used as the backbone of HOC's new superposed enumeration utility to generate programs satisfying dependently typed constraints at SOTA speeds.

Wrote a DSL for data pipelines of grids of threads with backends in C, CUDA, and Agda. This allowed for a single implementation of a multi-threaded interaction net evaluator that transpiled to CPU and GPU runtimes.

Freelance / Consultant [Rust, Python, Django, Docker]   (Jan 2023 - Jan 2024)
Contracted at multiple companies (CTFd, Sema Software, Taqtile) working on a variety of custom software, feature development, codebase maintenance, and customer support.

FOSSA · SWE [Typescript, PostgreSQL, Rust, AWS, GCP]   (Oct 2020 - Jan 2023)
Redesigned a portion of the DB schema leading to 50x faster API response times for the slowest endpoints. Designed a migration that updated 50 million rows to the new structure with zero-downtime. Led a team of 5 engineers to implement APIs for new search, filtering, and bulk action features enabled by the faster DB.

Led the development and customer feedback loop of an upcoming AOSP Monorepo product. Improved client-side scanning and UI of Monorepo projects by 30x through DB schema changes, algorithmic improvements, and cache pre-warming.

Google · SWE [C++, BigQuery, Python, Flume]   (Aug 2019 - Sep 2020)
Worked on the Interactive Questions team under Search. Improved the freshness of answers, created an automatic pipeline to initialize and monitor data, and built a cache system to speed up pipeline reruns.

Van Valen Lab · Researcher [PyTorch, Kubernetes]   (Sep 2018 - Jun 2019)
Greatly increased (~65% → ~95%) the cell tracking model accuracy on detecting divisions through improvements in data augmentation. Created a now patented data curating tool (DeepCell Label) to enable intuitive manual corrections of incorrect inferences. Designed a more efficient file format for inference data for DeepCell Kiosk.

Publications & Presentations

- HVM2: Interaction Combinator Evaluator – Video, Slides.   (ICFP / FProPer 2024)
- DeepCell: scaling deep learning–enabled cellular image analysis with Kubernetes.   (Nature Methods 2021)
- Accurate tracking and lineage construction in live-cell imaging experiments with deep learning.   (bioRxiv 2019)

Projects & Languages

Formalization [Lean]
The first to formalize Buffon's Needle in Lean.
Wrote a formally verified Affine Lambda Calculus normalizer.
Currently formalizing Rautenberg's *A Concise Introduction to Mathematical Logic*.

Intuitive [Rust]
A library for creating text-based user interfaces. Inspired by React and SwiftUI, with features resembling functional components, hooks, and a declarative DSL.

Advanced
Rust, Nix, Python, TypeScript, PostgreSQL

Competent
Lean, Agda, Haskell, Golang, OCaml, Bash, Swift, C++, C