Gregory Schare

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EDUCATION

Columbia University, New York, NY May 2024
B.A. in Computer Science and Mathematics. (GPA: 3.77)
Relevant coursework: Programming Languages and Translators. Advanced Programming (Unix, C, networking). Data Structures. CS Theory. Computer Systems. Modern Analysis. Modern Algebra. Multivariable Calculus and Linear Algebra (Honors). Discrete Mathematics. Readings in Analysis of Boolean Functions (with Shivam Nadimpalli); Cryptography (with Joseph Lee); Representation Theory (with Micah Gay). Macro and Microeconomics.

RESEARCH AND PROFESSIONAL EXPERIENCE

Programmer, Making and Knowing Project, Columbia University. New York, NY June 2020 – present

- Achieved 77x speedup of text analysis by replacing slow regex with XML parsing using the lxml library in Python
- Rendered dataset generation more convenient and accessible for non-technical researchers by leading refactor of legacy code from the ground up, implementing optional filters, and providing three additional data metrics
- Analyzed semantics of technical jargon and translation loss in 340-page medieval French manuscript using Word2vec, BERT, NumPy, Pandas, and Matplotlib
- Led archiving, data cleanup, and web presentation of student lab reports and essays using Google Drive API, Pandoc, and GNU tools while adhering to the minimal computing principles outlined by Ed and GO::DH
- Generated static sites exhibiting ongoing projects and archiving scholarly editorial discussion by augmenting Pandoc and Jekyll with custom content management and templating systems written in Haskell and JavaScript

PROJECTS

Imperative Programming Language. *Programming Languages and Translators* with Professor Ronghui Gu.
As a team of 5 students, designed and implemented an imperative programming language designed to enable type-safe task automation scripting. Prepared language proposal, formal language specifications, grammar, and final language report. Implemented language in OCaml using ocamllex for scanning and ocamlyacc for parsing. Built abstract syntax tree, semantic checker, and compiler to LLVM.

Model of Cognitive Analogy-Making in Racket. *Artificial Intelligence Honors* with Dan Anderson.
Modern functional programming implementation of Douglas Hofstadter's *Copycat* in Racket. Led eight other students and managed cooperative coding of a large project. Generated visualizations of simple character-string analogies using Racket's functional graphics library 2htdp/image. Results published in arXiv; see arXiv:1811.04747 [cs.AI].

Scheme Interpreter. *Structure and Interpretation of Computer Programs.*
Implemented a meta-circular evaluator, i.e. a Scheme interpreter written in Scheme.

Visual algorithms: metaballs, Floyd-Steinberg dithering, boid flocking.
Metaballs: algorithm for blending 2D shapes. Floyd-Steinberg dithering: algorithm for reducing colors in images while preserving content. Boids: simulation of bird flocking behavior.

HTTP web server. *Advanced Programming* with Professor Jae Woo Lee.
Developed HTTP web server and data server from scratch using Unix sockets API in C. Implements three-tier architecture. In addition to serving static HTML and media, the web server communicates over TCP with data server to dynamically deliver results of searching a database.

Programming Challenge in Haskell. *Advent of Code 2020.*
Solved 25 days of programming challenges. 78% pure functionally programmed in Haskell. Highlights: comonads, functional caching using lazy evaluation of infinite data structures, Chinese Remainder Theorem, parsers and domain-specific language implementations. Solutions available at github.com/gschare/aoc2020.

SKILLS

Programming languages: Proficient in C, Java, Python, Haskell, Racket. Experienced in Javascript, HTML, CSS.
Technologies: Proficient in Git, Unix, SQL, Three.js, Processing, Jekyll, Photoshop. Experienced in AWS, Digital Ocean, spaCy, Node, React, Next.js.

LEADERSHIP AND ACTIVITIES

Instructor, *Mastery Learning Hour.* Tutor K-12 students one-on-one in mathematics with a drop-in session format.
Webmaster, *Columbia Space Initiative.* Maintain statically-generated (Jekyll) club website. See columbiaspace.org.
Treasurer, *Columbia Platypus.* Manage club finances and guest speaker honorariums. Lead weekly reading group.