Apoorv Malik

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apoorvmalik.com | linkedin.com/in/maliap | github.com/1998apoorvmalik | leetcode.com/1998apoorvmalik

Technical Skills

Languages & Tools: C, C++, C#, Python, Haskell, Dart, HTML, CSS, JS, EJS, TensorFlow & Keras, PyTorch, Scikit-Learn, OpenCV, Flask, Numpy, Pandas, Node.js, Express, jQuery, React, Bootstrap, MongoDB, SQL, Docker, Flutter, Firebase, AWS, Unity, OpenGL, Figma, API Development, Git/GitHub, Linux/Bash
Research & CS Interests: Computational Biology (RNA Structure Prediction), Software Development (Mobile, Desktop and Web), Machine Learning, Computer Vision, Algorithms & Theory, Computer Graphics, UI/UX

Education

Oregon State University — Corvallis, OR, USA
PhD in Computer Science (GPA = 3.9) — *Sept. 2022 – Present*

Maharshi Dayanand University — Rohtak, HR, India
Bachelor of Technology (BTech) in Computer Science & Engineering (CGPA = 9.2) — *Sept. 2016 – Sept. 2020*

Experience

Research Assistant (mentored by Prof. Liang Huang) — December 2022 – Present
Dept. of Computer Science at Oregon State University — *Corvallis, OR, USA*

- Developed a linear time algorithm for RNA alignments, supporting calculations for partition function, base pairing probabilities, secondary structure predictions (MFE, MEA, Threshknot), and stochastic sampling of structures.
- Developing efficient algorithms related to RNA secondary structures prediction, and refactoring existing codebases by adding new features to enhance performance and scalability.
- Developed 6 web servers hosting various RNA algorithms, and optimized existing web applications leading to improved SEO, and a 500% increase in traffic, thereby enhancing the accessibility of our scientific tools.

Teaching Assistant (Algorithms and Theory of Computation) — March 2023 – Present
Dept. of Computer Science at Oregon State University — *Corvallis, OR, USA*

- Taught key concepts in Algorithms and Theory of Computation, including Complexity Analysis, Divide & Conquer strategies, Greedy & Graph Algorithms, Dynamic Programming, Grammar, and Turing Machines, which substantially improved students' understandings.
- Graded assignments and exams, providing constructive feedback to over 300 students and collaborated closely with the course professor/instructor to design and modify course materials and assignments.
- Regularly held office hours to address individual student's questions and maintained effective communication.

Software Development and Machine Learning Engineer — January 2020 - August 2022
Twyn (Previously Known as Marj Technologies) — *Noida, UP, India*

- Developed 3 IoT-based Industrial Automation and Quality Control applications for Non-Contact Dimensional & Quality Inspection, OCR, Parameter-based PA check, Object Classification, and Bar & QR code scanning.
- Contributed to the startup's seed funding of $328K and helped achieve a valuation of $3.7M by completing 4 projects for multiple clients of Marj (Ask Fras le Friction, Minda Group, Samsung India, and JBM).
- Interviewed 30+ job applicants for AI & Software Development positions and further built & managed the core team of 8 developers for product development. Implemented agile development methodologies, such as Scrum, to improve team efficiency.
- Led cross-functional teams of developers to deliver software projects on time and within budget, provided mentorship to 3 junior developers to improve their skills, and motivated team members to achieve common goals.

Publications/Preprints

- **Apoorv Malik***, Liang Zhang*, Ning Dai, Sizhen Li, He Zhang, David Mathews, and Liang Huang (2024). LinearAlifold: Linear-Time Consensus Structure Prediction for RNA Alignments. In submission to Journal of Molecular Biology (JMB) Special Issue on Computation Resources for Molecular Biology. (SSRN Preprint Link)
- Sizhen Li, **Apoorv Malik**, Ning Dai, He Zhang, David H. Mathews, and Liang Huang. LinearSankoff: Linear-time Simultaneous Folding and Alignment of RNA Homologs. In submission to NAR Journal. (arXiv Link)
- Liang Huang, Otso Barron, **Apoorv Malik**, Sizhen Li, David H. Mathews. Lazy Outside and Lazy Backward Algorithms. In submission to ISMB 2024 (International Society for Computational Biology).

Projects

LinearAlifold | Web Server Link | GitHub Link | SSRN Preprint Link — November 2023

- Developed a dynamic programming algorithm for RNA alignments' linear-time consensus structure prediction. It incorporates beam pruning (for enhanced computational efficiency), multiple energy parameters, and various computational modes.
- Enabled computation of the partition function and base pairing probabilities, with added support for predicting Maximum Expected Accuracy (MEA), Minimum Free Energy (MFE), and Threshknot structures. Additionally, implemented a mode for the Stochastic Sampling of Secondary Structures.
- Developed a web server for providing users the ability to input their own sequences and perform various functions, thereby enhancing practical applications of the tool.

Google Explore ML DSC Facilitator | Certificate Link — April 2020

- Conducted five workshops on machine learning, introducing core concepts and practical applications.
- Facilitated as part of the Google-sponsored Explore ML program, enhancing machine learning awareness among university students.

Computer Vision Project for Ask Fras-Le Friction Pvt. Ltd. — May 2022

- Automated part of the quality control and inspection process by developing a vision-based application for dimensional analysis and classification of brake liners in an industrial setting.
- Utilized multiple vision cameras for real-time measurement and quality assessment.

Machine Learning Engineer Capstone Project | GitHub Link — July 2019

- Developed a Deep Q-Learning (Reinforcement Learning) algorithm enabling an AI agent to master and significantly beat human players in the game of Atari Breakout.
- The AI agent discovered innovative strategies for high scoring, demonstrating the effectiveness of the implemented learning techniques and algorithmic intelligence.

Chess Game Development | Demo Link | GitHub Link — March 2022

- Programmed a chess game from scratch in Flutter & C++, focusing on efficient move generation using bitboards.
- Implemented advanced game features, including an AI opponent using the NegaMax algorithm and online multiplayer capabilities.

Teachable Image Classifier | GitHub Link — January 2022

- Created a app for non-experts to train deep learning models, enabling class creation and image sample addition.
- Designed with adjustable training parameters, making deep learning accessible and customizable for various needs.

Vedic Life Foundation App Development — September 2021

- Developed a comprehensive mobile application for meditation teaching, member enrollment, and session tracking, compatible with both iOS and Android platforms.
- Included social media features for community engagement, allowing users to share thoughts, ask questions, and track meditation progress.

Certifications

2021 Flutter Development Bootcamp | Certificate Link — January 2022

- Achieved proficiency in the Flutter framework and Dart programming language, essential for developing high-quality, natively compiled applications for mobile, web, and desktop from a single codebase.
- Developed skills in integrating APIs, cloud services like Firebase, and implementing efficient state management, along with mastering app deployment across multiple platforms.

Udacity - Artificial Intelligence Nanodegree | Certificate Link | GitHub Link — June 2020

- Learnt core AI concepts through projects that combined symbolic logic and classical search for effective planning, and Constraint Satisfaction and Local Search Optimization techniques for complex problem-solving.
- Acquired proficiency in strategic AI decision-making using algorithms like minimax and Monte Carlo tree search, and enhanced skills in machine learning, particularly in the application of Hidden Markov Models (HMM).

Udacity - Machine Learning Engineer Nanodegree | Certificate Link | GitHub Link — August 2019

- Mastered supervised learning techniques, including linear regression, decision trees, and support vector machines, and gained proficiency in unsupervised learning with clustering algorithms.
- Developed strong data processing skills, such as data cleaning, normalization, feature extraction, and utilized Principal Component Analysis (PCA) for effective dimensionality reduction.
- Developed expertise in deep learning, focusing on convolutional neural networks, and advanced skills in reinforcement learning, showcased in complex projects involving autonomous quadcopter navigation, Dog Breed Classification, Skin Cancer Classification, and Deep Reinforcement Learning game playing agents.