Karthic Palaniappan

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Education

Georgia Institute of Technology
MS, ANALYTICS
2023 - 2024 Atlanta, US

IIT Kanpur
B.TECH, BIOENGINEERING
2016 - 2020 Kanpur, India

Coursework

Ongoing: Artificial Intelligence • Data and Visual Analytics • Probabilistic Models
Completed: Computational Biology and Bioinformatics • Probability and Statistics • Calculus • Linear Algebra

Skills

Programming: Python • R • C/C++ • C# • Javascript • Ruby • PHP • Tcl • MATLAB • Scala
Web Scraping: Selenium • BeautifulSoup
Databases: MySQL • SQLite • PostgreSQL • ElasticDB
Machine Learning: TensorFlow • Scikit Learn
Visualization: Tableau • D3 • Plotly Dash • Matplotlib • Seaborn
Web: React • HTML/CSS • NodeJS • ExpressJS • Ruby on Rails • Django • Redis • sidekiq
Misc: Google Cloud • Git • Jupyter Notebook • Unity3D • Vivado • LaTeX

Publications

• Development and testing of a game-based digital intervention for working memory training in autism spectrum disorder | Scientific Reports (Nature) | *Prof. Nitin Gupta, IIT Kanpur*

Honors

Patent Filing Awards
AMD, XILINX
Filed *two patents* on optimizing VLSI CAD algorithms using *ML*

Impact Awards (x3)
XILINX
Awarded by *Corporate VP*, *Sr. Director*, *Sr. Manager* for outstanding contributions to Vivado ML

NMTC, 2014
Ranked *7th* amongst >100,000 participants in Math Olympiad

Experience

SOFTWARE DEVELOPMENT ENGINEER II (MACHINE LEARNING) | *AMD*
Jul 2020 – Aug 2023 Hyderabad, India

Summary
- Lead development of *6 ML features* across 6 Vivado release cycles enhancing Electronic Design Automation (EDA) flow for VLSI (FPGA) designs
- Published work to internal *conference* (5% acceptance), applied for *2 patents*
- Involved in recruitment of ML engineers; mentored an intern and a contractor

VLSI Compile-time Reduction using Convolution Modeling
- Modeled VLSI compile time (upto 20hrs) as a *convolution* of host-machine-unaware compile time and machine efficacy, achieved RMSE of *25 mins*
- Analyzed *error propagation* of operand functions ensuring null correlation
- Mitigated *curse of dimensionality* in training by dropping dependant features
- Re-implemented compilation scheduling using runtime and uncertainty predictions, leading to *30% faster compilations* and 50% lower CPU cores used

VLSI Placement Optimization using Round-Robin Classification
- Spec'd out design-driven placement directive prediction (15 classes) w.r.t WNS
- Implemented *round-robin classification* algorithm with XGBoost binary classifiers for 105 directive pairs (>0.8 F1 score), leading to *43% faster designs*
- Extracted *regions of sparsity* from designs (graphs) for various logic gates
- Automated feature engineering, modeling (>150,000 samples) with sklearn's Transformer-Estimator framework, pipelined from ElasticDB's API
- Productized, integrated feature (doc) to Vivado (ML Edition) 2021.2 to 2023.1

ML Infrastructure Initiatives
- ML Debug Tools: Developed techniques to identify *training data impacting predictions*, features influencing *cluster validity*; deployed for org-wide usage
- Auto Testing: Created unittest-based *Actions* framework to track model perf.
- Perf. Analytics: Built project-agnostic *Plotly* dashboards to visualize *t-SNE* feature clusters, uncertainty with *regression plots*, model drift with *kde plots*
- Feature Search: Find similar features (amongst 1000s) using text descriptions, via NLP tools including *POS tagging, NER, stopwords filtering, lemmatization*

BACKEND DEVELOPMENT INTERN | *Tagalys*
Dec 2018 Chennai, India

Shopify Web Tools
- Built a *Ruby on Rails* web plugin for Shopify online stores that enables updating their store-fronts to maximize conversion rate
- Developed a *JS user-action tracker* with *webhooks* and *cookies* to enhance product analytics, by capturing view, add-to-cart, and purchase actions
- Implemented *OAuth 2.0* with Shopify API, *thread-locking* backed *CRUD* ops to sync >10,000 products on Shopify stores with Tagalys' platform
- Used *Redis*, *sidekiq* to store token cache and manage scheduled queue

Projects

Digital Intervention for Working Memory Training | *Prof. Nitin Gupta*
Dec 2017 - Oct 2018 IIT Kanpur
- Developed mobile games using *Unity3D*, *C#* for children with Autism Spectrum Disorder (ASD), to enhance their visuospatial working memory
- Stored data using *SQLite* for fast retrieval during game-play, connected through C# *ORMs* representing player, score, progress information
- Published work (paper) to *Scientific Reports (Nature)*, analyzing statistical significance of impact from 5 games played by 13 children with ASD

Campus Placement Tracking | *Self-project*
- Developed SPONotify, a *cron* tool to track SPO (Students' Placement Office, IIT Kanpur) site for placement tests using *Selenium*, notifies via *smtplib*