

Prathyush S.P

"Develop a passion for learning. If you do, you'll never cease to grow"

Aim to equip myself with sound technical knowledge and skills necessary to solve problems such as AI Safety and Explainability, focusing majorly on enhancing AI Consumerism which augments human intelligence.

EDUCATION

Worcester Polytechnic Institute, Massachusetts — *Master of Science in Data Science*

August 2019 - MAY 2021 (Intended Graduation)

Focused on enhancing the statistical fundamentals and research capabilities. Pursuing Reinforcement Learning and Big Data Analytics. Research work is on defining the problem statement in Explainable AI and pattern analysis using saliency maps.

Maharaja Institute of Technology, Mysuru — *Bachelor of Engineering in Electronics and Communication, VTU, 72%*

August 2011 - July 2015 | 4 Years

Equipped myself with programming and electronics knowledge which helped in translating an idea to a product "PiScope", the culminating project of my graduating degree.

EXPERIENCE

Razorthink Technologies, Bengaluru — AI Engineer

JULY 2015 - JULY 2019 | 4 Years

As an AI Engineer, I design and architect AI Systems for enterprises and have taken the responsibility of mentoring and scaling the team for developing Deeplearning Infrastructure for the Razorthink AI Platform.

RESEARCH

[Differentiable Architecture Search - Neural Network Pruning by means of Differentiable learning](#) — Razorthink Technologies, Bengaluru

October 2018 - January 2019 | 3 Months

- A probabilistic system to find optimal solutions for "What to feed" and "When to stop" queries in the deeplearning domain.
- Developed an algorithm based on the rate of Information transfer and achieved a 25% reduced loss in less than 50% of the epochs using the DSC model compared to simple FFN on MNSIT Dataset.

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SCORES

GRE: 308 - Q:163, V:145
TOEFL: 110

CORE COMPETENCE

- Astute and Polymathic - Problem Identification and Solution Architect
- Swift Prototyping - Rapid development from idea to prototype
- Design and Architect AI Systems, End-to-End Pipelines and Python Libraries
- Full Stack Technical Literacy

SKILL SET

- Python, Java, Scala and Bash Scripting - Languages.
- Predictive Modelling, NLP, Computer Vision, Gradient Optimisations, Decision trees, Convolution Nets, Recurrent Nets (LSTM & GRU), Attention and Pointer Networks, Reinforcement Learning - Deeplearning
- TensorFlow, Keras, PyTorch, Flask, Spring Boot, OpenCV, JQuery, Pandas, Numpy, Sklearn, PySpark - Frameworks
- Mysql, MongoDB, Cassandra, Neo4J - Databases
- Hadoop, Spark, Kafka, Redis, Elastic Search - Big Data
- Web Stack, React.
- Docker, Jenkins, Kubernetes - Continuous Integration.
- C/C++, ALP, HDL/Verilog - Embedded Languages

Data Feed Pipelines - Fast, scalable data pipelines — *Razorthink Technologies, Bengaluru*

June 2018 - August 2018 | 2 Months

- Design of High performance, streaming and flexible data pipelines for training and evaluation of Deep Neural Networks using tensorflow dataset API.
- Segregated the development of a deeplearning model into design and execution phases
- Data pipelines coupled with dynamic graph construct paved way for lazy evaluation (Placeholder APIs flexibility) while maintaining the performance gains by dataset APIs

Explainable AI - Interpretability and Reasoning of a Black Box Model — *Razorthink Technologies, Bengaluru*

September 2017 - Jan 2018 | 4 Months

- Designed and developed a “Human-Machine Interoperable Model”, a multi-model architecture to derive explanations from a deep convolutional model on a time series data.
- The multi-model solves pattern ambiguity using dynamic patterns, optimized by a gradient-based approach.
- Built an algorithm for the Explanation Trust score as a metric for the explanations provided by the Human Block in the HMI model.

Model Funnel - An efficient, scalable model optimizer — *Razorthink Technologies, Bengaluru*

March 2017 - September 2017 | 6 Months

- Used a combination of statistical and generative modeling to optimize the model architecture.
- Taking cues from Genetic algorithms and Random fields resulted in arriving at the desired architecture based on domain metrics.

PRODUCTS

Razorthink AI — *Razorthink Technologies, Bengaluru*

September 2016 - PRESENT | 2 Years +

- An enterprise-grade AI Platform where my responsibility is to mentor and scale the team for developing Deeplearning Infrastructure for Razorthink AI Platform.
- A few of my contributions to the platform include the development of state-of-the-art modeling library (model-design, training, inference and deployment), scalable data pipelines, blueprint architecture and transfer learning.

Intelligent Document Processing — *Razorthink Technologies, Bengaluru*

January 2018 - July 2018 | 6 Months

- By developing a model based on convolutional recurrent networks and with the help of transfer learning, data augmentation and data parallelism, efficiently scaled the model to train on nearly 9 million images.
- Achieved over 97% accuracy in recognizing alphanumeric words.

AWARDS

Young Dynamite — Razorthink Technologies, Bengaluru

Microsoft Yappan Event Awardee — MIT, Mysuru

White Monkoon Awardee — AMS, Mysuru

OPEN SOURCE CONTRIBUTIONS
(<https://github.com/kingspp>)

- Tensorflow Contrib Analyser
- PyDSP
- Tensorflow Playground
- PMark
- Python Module Boilerplate
- Android TCP IP Socket
- Device to Device Communication
- DocuMat - DCompiler²
- RPi AUI

SEMINARS

- The advent of Deeplearning, SGD and Predictive Modelling - Axis Bank, Mumbai
- Efficient utilization of hardware resources by exploiting Model and Data Parallelism Architectures - Razorthink Technologies, Bengaluru
- Meta-learning and scalable efficient multi-task learning - Razorthink Technologies, Bengaluru
- Boltzmann Machines - Razorthink Technologies, Bengaluru
- Model agnostic explanations using LIME and Grad-CAM - Razorthink Technologies, Bengaluru

POSTER PRESENTATIONS

- Android - Tech Utkarsh by MIT, Mysuru
- Memristors - Impulse, by IEEE VVCE, Mysuru
- PyDSP - PyShop, IEEE SJCE, Mysuru

¹ The project was praised by *Martin Wicke* - software engineer at tensorflow and *Edd Wilder-James* - Open Source Strategist, Machine Learning at Google brain team which aided their api designs in tensorflow.

² A non-profit educational institution where I work as a software consultant on a need-basis (2011 to present).

Result Genie — Codetronix³, Bengaluru

August 2016 - PRESENT | 2 Years +

- A PAAS product where the role was to set the vision, design UX and develop appropriate UI using React.
- The product not only helped me to achieve full stack technical literacy but also provided me an exposure to learn and experience the art of entrepreneurship.

PiScope — MIT, Mysuru

June 2014 - July 2015 | 1 Year

- An affordable digital oscilloscope with an integrated Function Generator which can be controlled wirelessly and measure signals using any standard display device.
- The role was to translate an idea to a product, design and architect technical stack and develop required peripherals. (Opensourced)

AI SOLUTIONS

Customer Churn Prediction — Razorthink Technologies, Bengaluru

September 2017 - January 2018 | 4 Months

Mentored a team of young professionals to design, develop and deploy a deeplearning model to predict customer churn by analyzing cross-sectional and historical transactional data. Achieved a GINI score of 68 when trained on a skewed transactional dataset.

Life Insurance Propensity Model — Razorthink Technologies, Bengaluru

January 2017 - September 2017 | 8 Months

- Design and develop a multi-stage deeplearning model for multidimensional time-series data along with achieving over a GINI of 72.
- Developed an algorithm for auto-naming derived segments and optimized architecture by model funnel methodology.

Sentiment Analysis — Razorthink Technologies, Bengaluru

April 2015 - August 2015 | 4 Months

Relationship Strength Index, a probabilistic algorithm which translated to edges and email entities to nodes, to build a query system (CQL) using a graph database (Neo4J).

EXTRACURRICULAR

- Active volunteering and a donor for NGOs,
 - **Let's Do It Mysore** - to clean the grubby streets of Mysuru as part of the "Swachh Bharat Movement"
 - **Isha Foundation** - helps raise human consciousness and spiritual awareness.
 - **Siddaganga Mutt** - utilizes the money donated to educate and feed the underprivileged.
- Trained in Kickboxing, Participated and Organized Marathons as a part of the college cultural fest.
- Design and development of top tier Studio/Gaming Systems
- Plays Indian Classical Instruments - Tabla and Mridangam and read books on Business/Entrepreneurship
- Passionate traveler and nature/wildlife photographer (<https://www.flickr.com/kingspp>)

References upon request | Appendix - <https://kingspp.github.io/cv>

³ A startup that I co-founded with my colleagues while I was pursuing a Bachelor of Engineering. The idea was to identify a specific set of problems and provide solutions either by automation or by enhancing an existing solution, thereby enabling us to experiment with our learnings as an engineer.

APPENDIX

Differentiable Architecture Search – Neural Network Pruning by means of Differentiable learning — Razorthink Technologies, Bengaluru [\[return\]](#)

October 2018 - Present | 3 Months +

VISION

- Inspired by Dynamic Neural Architectures, design and develop a probabilistic system to find optimal solutions for “What to feed” and “When to stop” queries in the deeplearning domain.
- To build capabilities of Auto DL, An automated deeplearning architecture optimizer based on data feed and domain.
- Research on building efficient neural architecture search.

ACCOMPLISHMENTS

- Developed “Global Short Circuit (G-SC)” schema which had a linear flow, moderate local minima and non-scalable architecture
- Conceptualized the idea of “Differentiable Short Circuit (D-SC)” based on ideas of NALU (usage of differentiable matrices) and RESNET (Shortcut connections), an advanced version of G-SC.
- D-SC overcame the shortcomings of “Global Short Circuit” with a linear flow, the best local minima and a scalable architecture.
- The idea led to the formulation of the rate of “Information Transfer” i.e flow of data from one part of the network to another.
- After performing rigorous experiments between Fully Connected Network (FCN), G-SC and D-SC (MNIST Classification), D-SC had a clear advantage over both G-SC and FCN. The architecture had reached a local minima on test data which showed an additional 20% decrease in nearly 80% of the time taken by FCN.
- The research direction helped us to get closer to answer daunting queries in the field of deeplearning “What to feed” and “When to stop”.

ROLE

Principal Researcher

MENTOR

Dr. Nandu Nandakumar – CEO, Razorthink
Sunil Kumar Vengalil – Chief Director of Research, Razorthink

TOOLS

Python, Tensorflow, Numpy, Pandas

SIGNIFICANT LEARNING

- Building end-to-end differentiable pipelines
- Differentiable Architectures
- Pruning of Artificial Neural Networks
- Gradient-based optimization techniques
- Neural Accumulator, Neural Arithmetic Logic Units and RESNET Architectures

Explainable AI - Interpretability and Reasoning of a Black Box Model — Razorthink Technologies, Bengaluru [\[return\]](#)

September 2017 - Jan 2018 | 4 Months

VISION

- To understand CNN patterns through black box visualization and representation - Justification / Reasoning
- Understand the difference between lower and higher-order feature detection - Transfer learning and generalization.
- Leverage learning from one entity to another.

ACCOMPLISHMENTS

- Designed a convolutional setup for time-series data to detect patterns across various features with a significant uplift of 46% in train and 51% in test GINI.
- Conceptualized the idea of the Human-Machine Interoperable Model which sported a multi-model architecture, where the machine block was tasked for classification, the human block had been given a regression problem.
- Conceptualized the idea of “Dynamic Patterns”, Pattern which is derived from a deeplearning model verified over time using backpropagation and are subjected to gradient-based optimizations, thereby giving us a significant improvement in pattern stability compared to static patterns
- Visualization of Convolution Patterns by means of Dynamic Patterns
- Built different pipelines for train and inference flows.
- Concept of Data lake for storage and retrieval of observation, cluster, model, attribute and explanation entities.
- Design of architecture based on Human-in-the-loop (HITL) to improve derived explanations.
- Derived Explanation Trust Score, an algorithm based on cluster distance and similarities.
- Derived slope-intercept theory, a significant change in the slope of features for attributes between a high event rate and low event rate suggests feature importance.

ROLE

Principal Researcher

MENTOR

Dr. Nandu Nandakumar - CEO, Razorthink

Dr. Nagesh Adiga - Chief Research Scientist, Razorthink

TOOLS

Python, Tensorflow, Numpy, Pandas, Matplotlib, Flask, Webstack, MongoDB, Hadoop, NFS, MySQL

SIGNIFICANT LEARNING

- Convolution setup to detect patterns across various features in a time series dataset (Filters, Strides and Kernel configurations).
- Multi-model optimizer configuration and training.
- Static vs Dynamic Patterns
- Model Stability and Accuracy validation using slope theory
- Human-in-the-loop Architecture

Data Feed Pipelines - Fast, scalable data pipelines — Razorthink Technologies, Bengaluru [\[return\]](#)

June 2018 - August 2018 | 2 Months

VISION

- Segregate the development of a deeplearning model into design and execution
- Find an optimal solution to configure data pipelines during design and translate it to execution in a streaming fashion.
- Perform research and analysis on various types of available data feed mechanisms.

ACCOMPLISHMENTS

- Designed and developed multiple architectures for data feed mechanisms, Basic Placeholders, Basic Datasets, Feedable and Generator Datasets, Feedable Iterators, Feedable Generators coupled with feedable iterators, Generator Dataset with multiple yields, Re-initializable Iterator Switch, Feedable Iterator with Multi Dataset Initializers, Usage of Placeholder with default handlers
- Performed benchmark analysis based on data throughput and model performance for various architectures and finalized Reinitializable Iterator Switch coupled with dataset-api architecture for the platform.
- Ability to use placeholders during model builder and leverage the scalability of distributed architectures through Reinitializable iterators with feedable datasets during execution.
- Building operations in a directed acyclic graph by extending original DAG which provided support for graph merge capabilities where the latter helped in extending and customizing a pre-trained canned model (VGG, RESNET) for a domain-specific solution.

ROLE

Principal Researcher

MENTOR

Dr. Nandu Nandakumar - CEO,
Razorthink

Vidya Shankar - VP of Engineering,
Razorthink

TOOLS

Python, Tensorflow, Benchmark
Tools (PyMpler, PMark), Kafka

SIGNIFICANT LEARNING

- Design of Efficient Data pipelines for the model which supports streaming architecture
- Queuing Mechanisms, Scaling Producer / Consumer Configuration, Read Index Handling, Data Persistence
- Tensorflow Data Set APIs and their designs, Iterators and different types of Initializations.
- Lazy evaluation of data using generators.
- DAG and its uses, conversion of a workflow to a dag

Model Funnel - An efficient, scalable model optimizer — Razorthink Technologies, Bengaluru [\[return\]](#)

March 2017 - September 2017 | 6 Months

VISION

- To design and develop a model optimizer aimed at achieving robustness, by modifying the architecture in a dynamic fashion
- To inject domain intelligence in order to achieve explainability.

ACCOMPLISHMENTS

- Conceptualized funnel architecture which took cues from genetic algorithms and random fields, resulted in arriving at the desired architecture based on domain metrics.
- Built an optimizer based on a combination of statistical and generative modeling approach to optimize the model architecture.
- Successfully injected domain knowledge to enhance explainability by use of features better known by the business.
- Modularized objective function and Template based models helped in building a generalized optimizer which was used for various client projects to solve problems in different domains (Longitudinal Patterns, Computer Vision)
- Built entry and exit triggers based on an exponential change in the chosen metrics and introduced stage based data feed which enhanced the performance of the module.

ROLE

Principal Researcher

MENTOR

Dr. Nandu Nandakumar - CEO,
Razorthink

TOOLS

Python, Tensorflow, Sklearn,
Matplotlib, Java, Tomcat,
Pandas, NumPy

SIGNIFICANT LEARNING

- Genetic Algorithms and Random Fields.
- Statistical Inference and Generative modeling.
- Domain knowledge and its induction.

Razorthink AI — Razorthink Technologies, Bengaluru [\[return\]](#)

September 2016 - PRESENT | 2 Years +

VISION

- To build a lightweight, modularized deeplearning library with simple and clean api, zero memory leaks which is easy to install and has support for end-to-end documentation.
- To ease and standardize the process of building and running deeplearning models in a distributed manner that adapts to the nature of streaming data pipelines.

ACCOMPLISHMENTS

- Segregation of concept of modeling into an intuitive “*Model Builder*” and highly flexible and configurable “*Runner Builder*”.
- Efficient Data Pipelines for data feed and inference.
- The capability of Dynamic Graph execution by selecting suitable placeholders based on optimizers adaptable for various data feed and split configurations.
- Conceptualized and developed the idea of Component, Blueprint and Hook Architectures for rapid prototyping.
- Zero downtime, automated blueprint architecture for transferring library components to application usage.
- Efficient Memory Utilization using dynamic graph fetches.
- Ease of performing Transfer learning of various opensourced models using raw tensorflow checkpoints.
- Matrix to Node level abstraction and JSON based model building and configuration.
- Modularized DL backends with support for Plug and Play model entities.
- Model analyzer which supports compile-time validation and run-time selection process based on metrics.
- Support for Stacks and Groups to ease the processing of building complex models such as ResNet, VGG and others.
- Support for multi-model adversarial architectures by providing the ability to have multiple objective functions with respective optimizers and share/reuse weights in order to build the said architectures.
- Efficient streaming of NumPy arrays over Kafka Queue.

ROLE

Lead AI Engineer

MENTOR

Dr. Nandu Nandakumar – CEO,
Razorthink
Vidya Shankar – VP of Engineering,
Razorthink

TOOLS

Python, Tensorflow, Numpy, Pandas, Matplotlib, Flask, Webstack, Kafka, Hadoop, Spark, OpenCV, Bash Scripting, Sphinx, Jenkins, Kubernetes, Docker, Horovod, MongoDB, MySQL, Redis, VCS, Scala

SIGNIFICANT LEARNING

- Usage of Generators, Decorators, Itertools, Logging, Comprehensions, Object-oriented concepts, Threading, Dynamic Dispatch and Callbacks in Python.
- Scalable, Modularized, Highly Configurable, Python Library which is unit-tested for functionality and zero memory leak with high coverage.
- Automate release cycles, document generation, code coverage tests, commit validator and package creation using github-hooks coupled with Jenkins CI.
- Insights into Inner-engineering of parallelism architectures such as data and model parallelism coupled with Kubernetes for deployment.
- Data streaming architecture to support large amounts of data using Distributed file systems for data store and Queues for data channels.

Result Genie — Codetronix, Bengaluru [\[return\]](#)

August 2016 - PRESENT | 2 Years +

VISION

- A PAAS (platform as a service) product aimed at refining the process of analytics in the field of education.
- Automate the tedious and recurring process of updating records of students with support for performing on-the-go advance analytics projected in stunning and user-friendly visuals.

ACCOMPLISHMENTS

- Conceptualized a clean, simple, intuitive UX with a single search mechanism (one-way entry, multiple exit endpoints), which overcame the hassle of the tedious process of navigation.
- Designed and developed a responsive UI using React which supported a wide variety of display devices and resolutions.
- As a PAAS architecture, streamlined the process of continuous integrations with zero downtime using the approach of containers.
- Designed and developed a web scraping tool to fetch results in HTML markup using PhantomJS and CasperJS.
- Built a parser to translate Unstructured Data (HTML markup) language to Structured Data (JSON structure) to support queries.
- Developed multi-tenant architecture to support multiple educational institutes.
- With the help of typeaheadJS and elasticsearch, built a custom search engine, used to search, candidate, subject and respective semester statistics.
- Support for a seamless transition from JSON data to SQL records using data entities following ORM designs.
- Support for candidate timeline, an automated representation of candidate current state and statistics.
- UX designed to aid the Parent-Teachers Conference, where one can grasp a candidate's history in a single glance.
- Developed an algorithm “RG Score”, derived considering various factors such as infrastructure, students to teacher ratio, candidates' competency, used to score educational institutes in an effort to enhance the capabilities of institutes.
- Build support for candidate selection with a selection strategy for placement opportunities.
- Insights derived from the platform, coupled with “RG Score”, drove ROI by enhancing teacher engagement, candidate supervision and a solid understanding of inner-engineering of the system.

ROLE

Co-Founder and UI, UX Developer.

MENTOR

Dr. Mahesh Rao – HOD Dept of ECE,, MIT, Mysuru

TOOLS

React, Webstack, Python, VCS, Numpy, Pandas, Spring Boot, Hibernate, Nginx, Spark, Bash Scripting, Phantom and CasperJS, MongoDB, MySQL, Maven, Docker, Spark, TypeaheadJS, Elastic Search

SIGNIFICANT LEARNING

- The nuances of being an entrepreneur i.e managing resources, translating the idea to a product, product pricing, marketing and sales.
- Selecting Technology stack based on product requirements
- Designing user experience and architecting user interface for the same.
- Data mining and Web Scraping using Python open-source library.
- Database schema design and entity relation mapping.
- Spawning a VPS and configuring proxies using Nginx.
- Platform as a service (PAAS) - idea, setup and pricing.

PiScope — MIT, Mysuru (opensource) [\[return\]](#)

June 2014 - July 2015 | 1 Year

VISION

- To provide an alternative solution, a multi-purpose digital oscilloscope with the control options and computational capabilities of a standard oscilloscope that is inexpensive and affordable which is modeled considering factors such as Portability, Affordability, Reusability and Flexibility.
- Generating a signal of appropriate frequency in accordance with the data given by the user.
- Converting the analog signals into digital format and plotting them on the graph on the screen with the help of a control unit.
- Introduce a set of collaborative features with the help of IoT Architecture.

ACCOMPLISHMENTS

- Verified generation of 50Hz, 5Khz and 500Khz waveforms of types Square, Triangle and Sinusoidal from an external DAC (AD9850) using conventional DSO.
- Successfully detected waveforms generated by a generic function generator using Raspberry Pi coupled with an ADC (MCP3208) and plotted waveforms using GNU Plot and proprietary software.
- Successfully built a fully-featured java application as a deployable jar with user interface powered by JavaFX, used to display detected waveforms on a standard display device.
- An android application was developed to control the frequency and type of signal generation through a flask server.
- Enhanced performance and compatibility of Raspberry Pi by modifying kernel-level modules.
- The device was powered by a commonly found 5V 2A charger, which was then distributed between Raspberry Pi and Frequency Synthesizer with support for the adjustable duty cycle.
- Efforts of Java FX Application development, Raspberry Pi GPIO Configuration, PIC Interfacing, Android Application, and other component are opensourced ⁴

ROLE

Researcher, Designer and Developer

MENTOR

Dr. Murali – President, MIT, Mysuru
 Dr. Mahesh Rao – HOD, Dept of ECE, MIT, Mysuru
 Srinivasa MG – Professor, Dept of ECE, MIT, Mysuru

TOOLS

Java, JavaFX, WebStack, Android, Raspberry Pi, PIC (microcontroller), AD9850 (DAC), Flask, C/C++

SIGNIFICANT LEARNING

- Basics of entrepreneurship i.e, Problem identification and solution engineering.
- Translation of an idea to a product by means of meticulous research.
- Concepts of Stage, Scene and Elements in JavaFX.

⁴ [RPI-AUI](#) - A Basic introduction for Configuring Raspberry Pi on Arch Linux. It performs on-the-go CPU Scaling operations, [PiScope](#) - PIC program with ADC and LCD 20x4 interfacing, [RPI-Piscope](#) - JAVA FX package, UI for PiScope, [PyDSP](#) - DSP algorithms solved using Python with Django Framework, [RPI-JavaIO](#) - Java GPIO programs, [PiScope-Android](#) - PiScope Android application, [PiScope-Flask](#) - PiGeneration using HTTP with Flask framework

Intelligent Document Processing — Razorthink Technologies, Bengaluru [\[return\]](#)

January 2018 - July 2018 | 6 Months

VISION

- Ensemble intelligence to analyze scanned documents, allowing higher accuracy than individual algorithms.
- Automated structure extraction from heterogeneous documents without detailed rule specification.
- Intelligent confidence computation from multiple signals.

ACCOMPLISHMENTS

- Built image processing pipelines to remove noise, adjust tilt and apply thresholding policies.
- Converting scanned documents to text by the use of multiple technologies, one of them is a sequence of pattern detection based on convolutional recurrent network architecture.
- Automated layout and format detection (tables, paragraphs) using Region Proposals coupled with Fast Recurrent Networks.
- Developed automated detection of constructs (addresses, invoice items, custom constructs) using custom algorithms with support for Entity recognition and Knowledge graph creation
- Efficiently scaled the model to train on nearly 9 million images using tensorflow, horovod and mpi with support for Multi-node multi-gpu architecture (data parallelism).
- Built Annotation tool for adapting to a new domain and with the help of Data Augmentation techniques, improved the model performance significantly (nearly 30% increase in detection accuracy).

ROLE

Principal Researcher

MENTOR

Dr. Nandu Nandakumar – CEO, Razorthink
Sunil Kumar Vengalil – Chief Director of Research, Razorthink

TOOLS

Python, Tensorflow, Estimators, Numpy, Pandas, Matplotlib, Flask, Webstack, MongoDB, Horovod, MPI

SIGNIFICANT LEARNING

- Connectionist Temporal Classification as an objective function
- Detection of Patterns and Sequence of Patterns using Convolution and Recurrent Architectures.
- Concepts of Data and Model Parallelism, Data Augmentation and Transfer Learning
- Multi-node, multi gpu cluster configuration for data parallelism in AWS and GCE
- Data augmentation techniques (tilt, crop, gaussian blur, white noise)
- Tensorflow Estimator, Lookup tables and initializers

DocuMat — DCompiler, Mysuru [\[return\]](#)

Jan 2013 - July 2013 | 6 Months

VISION

- To build an automated document formatter to ease the tedious process of formatting documents.
- The application should have a clean and simple UX in order to serve the purpose.

ACCOMPLISHMENTS

- Built necessary components required to process the given data using PHPWord framework.
- Drag-and-drop based functionality to enable a simple yet intuitive way of formatting.
- Handled file uploads, downloads and management, provided customizations for a topic, headings and other labels.
- User management using browser session and cookies.

ROLE

Lead Developer, UX, UI and Backend

MENTOR

Chandra Prasad R – CEO, DCompiler

TOOLS

PHP, PHPWord, Webstack, MySQL

SIGNIFICANT LEARNING

- Working knowledge of PHP and integration of MySQL with PHP
- Difference between SOAP, WSDL and REST API's
- File management and User Management

Customer Churn Prediction — Razorthink Technologies, Bengaluru [\[return\]](#)

September 2017 - January 2018 | 4 Months

VISION

- Identify customers who are likely to churn by analyzing cross-sectional (demographics, behavioral) and historical transactional data.
- Automated the process of analyzing customer transaction data and derived features with respect to customer behavior.
- Provide a rationale to the client as to why the customer would churn, based on behavioral traits

ACCOMPLISHMENTS

- Segregation of Transactional data to monthly aggregations, thereby introducing longitudinal patterns.
- Recurrent Network Architecture to detect a sequence of patterns.
- An uplift of nearly 30% from the base logistic regression model in the preferred deciles
- Won the best Data Science Project Of The Year Award At Cypher 2018.

ROLE

Team Lead

MENTOR

Swarup K Adhikari – Program Manager, Razorthink

TOOLS

Java, Spark, Python, Sklearn, Pandas, Numpy, Matplotlib, Tensorflow

SIGNIFICANT LEARNING

- Deeplearning Experimental setup and configuration.
- Pattern Sequence modeling using Recurrent Networks (LSTM / GRU)
- Translation of Model Prediction metrics to Business Insights ()
- Usage of Derived variables in deeplearning model
- Leadership, teamwork and mentorship

Life Insurance Propensity Model — Razorthink Technologies, Bengaluru [\[return\]](#)

January 2017 - September 2017 | 8 Months

VISION

- Predict the propensity of a customer for a specific behavior from historical transactional patterns.
- Automated feature engineering for transactional financial data.
- Automated explanations, consumable by business owners.
- Automated cluster naming that assists strategies.

ACCOMPLISHMENTS

- Auto-naming algorithm for the micro-segments using Clustering and Divergence Algorithms which helps in knowing the cluster characteristics.
- Automated Feature engineering, where the algorithm performs dimensionality reduction enabling training the model with required features, enhancing the convergence. The combination of features is not random but is based on its explainability.
- Develop a system based on valued inputs from an agent which provides actionable insights regarding the customer, explaining the 'why' of the prediction using statistical evidence

ROLE

Principal Researcher

MENTOR

Swarup K Adhikari – Program Manager, Razorthink

TOOLS

Java, Spark, Python, Sklearn, Pandas, Numpy, Matplotlib, Tensorflow

SIGNIFICANT LEARNING

- Exploratory Data Analysis and Data Ingestion using big data tools such as Spark.
- Usage of Tensorflow, design and development of Parallelism Architectures.
- Production rollout and Application Deployment.

Sentiment Analysis — Razorthink Technologies, Bengaluru [\[return\]](#)

April 2015 - August 2015 | 4 Months

VISION

- Email ingestion and insights derivation using Natural Language Processing
- Visualization of derived insights.
- Email Summary and Sentiments to enrich insights

ACCOMPLISHMENTS

- Translation of email entities to nodes and relationship strength index to edges, and to build a query system (CQL) using a graph database (Neo4J).
- Development of RSI (Relationship strength index), Sentiment and Summary Algorithms.

ROLE

Principal Researcher

MENTOR

Shams Mali – CTO, Razorthink

TOOLS

Stanford NLP and POS Tagger, Neo4J Graph Database, Cypher Query Language, Java

SIGNIFICANT LEARNING

- Basics of Natural Language Processing
- Usage of Naive Bayes classifier
- Entity recognition using NLP and POS Tagging.
- Usage of Graph Queries and Databases.

Differentiable Learning — Razorthink Technologies, Bengaluru

October 10, 2018

Differentiable Learning Inception and its advantages

SIGNIFICANT LEARNING

- Basics of Differentiable Learning
- Neural Network Pruning by Differentiable Learning
- How to automate data feed to the neural network
- Insights on global minima

Recent Advancements in Deeplearning-Phase 2 — Razorthink Technologies, Bengaluru

September 9, 2018

Recent Advancements in the field of Deeplearning

SIGNIFICANT LEARNING

- Federated Learning, Homographic Encryption, Switchable Norm, NALU, Gradient Checkpointing, Network Quantization, Differentiable Architecture Search, Tensorfuzz, Trends

Boltzmann Machines and their uses — Razorthink Technologies, Bengaluru

April 12, 2018 [\[return\]](#)

Introduction to Unsupervised Learning

SIGNIFICANT LEARNING

- The architecture of RBM's
- Deep Belief Networks
- Machine State Representation

General Adversarial Networks — Razorthink Technologies, Bengaluru

April 1, 2018 [\[return\]](#)

Introduction to Adversarial Multi-model Networks

SIGNIFICANT LEARNING

- Basic principles of Adversarial Nets
- Working phenomenon of Multi-model Nets
- Implementation in Tensorflow

Capsule AI — Razorthink Technologies, Bengaluru

October 23, 2017

Capsule Networks and their advantages over neural cells

SIGNIFICANT LEARNING

- Traditional CNN's and their Disadvantages
- Traditional Neuron vs Capsule
- Squash Activation, Forward and Backward Propagation
- Dynamic Routing

Fast, Scalable DL Model Serving — Razorthink Technologies, Bengaluru

September 01, 2017

Tensorflow Serving, its disadvantages and RZTDL Serving

SIGNIFICANT LEARNING

- Basics of Model Serving
- Production deployment of Trained Model
- Scalable, Fast throughput of Inference Pipelines
- Model Versioning and Switching

Recent Advancements in Deeplearning - Phase 1 — *Razorthink Technologies, Bengaluru*

August 24, 2017

Recent Advancements in the field of Deeplearning

SIGNIFICANT LEARNING

- Various Tools for DL, Dynamic Coattention Nets, Pixel Nets, Wavenets, Transfer learning, Deep Reinforcement Learning, Memory Nets, Siamese Nets, Zero/One-Shot learning, Evolution Strategies, Bayesian Optimization, Multi-Task Learning, Neural Architecture Search, Programmable Agents, Trends

Model agnostic explanations using LIME and Grad-CAM — *Razorthink Technologies, Bengaluru*

October 25, 2016 [\[return\]](#)

Black box interpretation

SIGNIFICANT LEARNING

- Global vs Local Model
- Training with Perturbed samples
- Locally weighted Regression and Piecewise Linear Model
- Gaussian Kernels and Weight Matrices

The advent of Deeplearning, SGD and Predictive Modelling — *Axis Bank, Mumbai*

August 8, 2017 [\[return\]](#)

Basics of Deeplearning, Python and Tensorflow

SIGNIFICANT LEARNING

- Basics of Graph Model, Matrix to DAG
- Stochastic Gradient Descent
- Forward and Backward Propagation with Gradient Compute and Apply Strategies
- Tensorflow Runtime and Distributed Tensorflow
- Basics of Python

Efficient utilization of hardware resources by exploiting Model and Data Parallelism Architectures — *Razorthink Technologies, Bengaluru*

April 04, 2017 [\[return\]](#)

Parallelism techniques and their implementations

SIGNIFICANT LEARNING

- Data Parallelism
- Model Parallelism
- Server, Client, Cluster Speck, Job, Task
- Synchronous and Async Training