Reetesh **Mukul**

Senior Software Developer | Machine Learning Developer | Architect

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Experienced Software Developer, Architect mostly working in Machine Learning areas. I work for Adobe in their Machine Learning based Sensei Team. My job is to research, develop, and deploy end-to-end solution for Lightroom Software of Adobe. I have core competence in Mathematics, Software Architecture, Software Performance, and Model development.

Compétence

Domain Expertise	**Deep Learning**, **Statistics**, Distributed Systems, Computer Vision, Classical Machine Learning, Parallel Programming, Reinforcement Learning, Functional Programming, Advanced Mathematics, Eager Computing, MASK RCNN, Open Pose
Programming Languages	**C++20**, **Python**, Haskell, Java, Rust, Javascript, Lua
Frameworks	**BOOST**, **Keras**, **Tensorflow**, **Torch**, Redis, ONNX, CGAL, Eigen3, OpenCV, LLVM, SqLite, MongoDB, Detectron, DLib, MlPack
Development Tools	**Visual Studio Code**, **Visual Studio**, **XCode**, IntelliJ Idea, Git
Tech Pieces	**LSTM**, **CNN**, **GAN**, **Pointer Networks**, Linear Algebra, Batch Shop, Metaprogramming (C++), Statistcial Programming
Operating Systems	Mac OS X, Windows, Linux, RTOS(ARM, Snapdragon)

Professional Experience

Today / **Apr 2020** — **Machine Learning Developer, Adobe, India**

- Sensei : ML Model development and deployment
- Visual Similarity Model Development
- Panoptic Segmentation : Module development on Post Processing side.
- Metric development for ML models.
- Static Library development using Torch

Torch | ONNX | CoreML | Keras | Tensorflow | CNN | LSTM | Clustering

Mar 2020 – Sep 2016 | **Senior Software Developer | Machine Learning Engineer, Adobe, India**

- Lightroom Performance : Performance enhancement for Lightroom Classic Import, Grid and Library
- Markov Decision Process based Dynamic Algorithm for Import : Parallel Distributed Batch Allocation based on MDP.
- Performance Database for Lightroom : Light-weight embedded Performance Database which Profiles Lua code automatically
- Common Table Expressions for folders, keywords. Facilitates very fast light weight low latency queries.
- Feature Prediction : Natural Language Model for Photographic Features. Predicts future features based on previous features.
- Analytics for Lightroom.
- ML Models for Churn analysis and Garbbage Collection

XCode | Visual Studio | Lua | SqLite | R | Python | Keras | Torch | Hadoop | Hive | LSTM | Reinforcement Learning | Distributed Programming | Scheduling | Markov Decision Process

Aug 2016 – Aug 2015 | **Senior Software Developer | Machine Learning Engineer, Flipkart, India**

- ML Model for Ad Click Prediction : CTR, CVR prediction and Ad Ranking
- Ad SDK for Mobile Platform

Ads | Native Ads | Pandas | R | Ranking | Sampling | Android | Thompson Sampling | Distributed Programming

Jul 2015 – Dec 2011 | **Senior Software Developer | Machine Learning Engineer, Qualcomm, India**

- Optical Character Recognition for Indic (Devnagiri) Letters
- Online detection of interesting scenes in Camera

Computer Vision | C++ | OpenCV | Android | Python | Assembly | Parallel Programming

Nov 2011 – June 2008 | **Software Developer, Qualcomm, India**

- Voice State Machine and Driver Development

C++ | Embedded Systems | Parallel Programming

May 2008 – June 2006 | **Software Developer, Texas Instruments, India**

- Global Positioning Systems software development

C++ | Embedded Systems | Assembly Language

Projects

LrSensei (Adobe) 2020 -

Computer Vision Project Ranging From Best Photos, Auto Stacking to Panoptic Segmentation

Lightroom Sensei is a multiple-goal Computer Vision Project. Currently, I am working on Best Photos, Visual Similarity, and Panoptic Segmentation. My goal is to enhance and develop models, look for its deployment, try to find out suitable metrics, establish requirements by Users, and look for guarantees that different models provide. This work also involves choosing the deployment choices for the model -like can we put on client-side or on the server, how effectively jobs can be distributed on CPUs and GPUs.

Torch | ONNX | CoreML | Feature Pyramids | Contrastive Learning

LrPerformance (Adobe) 2016 - 2020

Performance Enhancement and User Analysis for Lightroom Classic

Lightroom Performance Enhancement had four major directions -(a) Efficient Algorithms, (b) Deep Parallelism, (c) Better Resource management, and (d) Machine Learning to achieve goals associated with (a)-(c). In an adversarial environment where User requirements are unknown, where Computation is costly (as Lightroom is a Photography Application) and Operations are done on multiple assets at the same time(here assets are Images), the challenges become multi-faceted. We successfully used Common Table Expressions of Database and System Parallelism to gain Performance. Thereafter we deployed Classical Reinforcement Learning based solutions, Markov Decision Process and Bandits to estimate resources. This is a very new paradigm, which has been successfully productized. Some of the developments, for example for Grid, involved estimating Geometry shifts using Weibull Distribution. Other than Performance, we used User Log data to predict future features, User churn rate, Probability of user to convert. We even tried to do Garbage Collection in Lua using Reinforcement Learning.

C++ | Lua | SqLite | Markov Decision Process | Reinforcement Learning | Keras | LSTM | Hive | Hadoop

Devnagiri OCR (Qualcomm) 2011 - 2015

Optical Character Recognition for Devnagiri

. We developed Optical Character Recognizer for Indic (Devnagiri) Characters. We developed both Char Decoders and Word Decoders. This solution was developed for Mobile Devices hence challenges were on performance side as well. One of my goals was to develop cache aware vector routines. I developed Algorithm for Chandrabindu development and also wrote modules for Word Decoders.

C++ | Computer Vision | Machine Learning | Android

Papers and Patents

1. Markov Decision Process for Efficient Data Transfer
2. Context-based Recommendation System for Feature Search
3. Environment Aware Application-based Resource Management Using Reinforcement Learning
4. Automatic Teeth Whitening Using Teeth Region Detection And Individual Tooth Location
5. Photo-Editing Application Recommendations
6. Parameter Estimation for Accelerometers, Processes, Circuits, Devices and Systems. https://patents.google.com/patent/US20090259424A1/en
7. Broadband Hf/Vhf/Uhf Communication on Power Lines. https://patents.google.com/patent/WO2007000777A1/de.

8. R. Mukul et al., ”An adaptive bandwidth request mechanism for QoS enhancement in WiMax real time communication,” 2006 IFIP International Conference on Wireless and Optical Communications Networks, Bangalore, 2006, pp. 5 pp.-5, doi : 10.1109/WOCN.2006.1666583.

Education

2006 **M.Tech** [IIITB Bangalore]
2004 **B.Tech** [BIT Sindri]

Languages

English ●●●●●
Hindi ●●●●●

Forces

- Learner
- Passionate
- Motivated
- Autonomus