

Akash Palrecha

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EDUCATION

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE (BITS), PILANI

Pilani, RJ, INDIA

MSc. (HONS) MATHEMATICS (CGPA: 7.34/10)

Aug 2017 - May 2021

Relevant Coursework: Neural Networks & Fuzzy Logic, Machine Learning, Optimization, Data Structures & Algorithms, OOP

Teaching Experience: Teaching Assistant for Neural Networks & Fuzzy Logic: aid in assignments, final research paper project

Online Courses: FastAI: Foundations of Deep Learning Research, CS231n, Computational Linear Algebra (FastAI, ongoing)

Note: I dropped my dual B.E. EEE degree in my second year to spend more time doing AI research and get more involved in Pixxel.

ACHIEVEMENTS

- Became a **FastAI International Fellow** for being a top contributor to the FastAI Course and online AI community. Jan 2020
- **#1 on leaderboard**: Weights & Biases **Draught Detection Challenge** from Satellite Imagery (**Val acc: 76.59%**) Aug 2019
- **Published on Matplotlib's Official Blog**: *An Inquiry Into Matplotlib's Figures* (100,000 organic reach on Twitter). Dec 2019

PROFESSIONAL EXPERIENCE

PIXXEL

Bengaluru, India

AI Lead

Feb 2019 - Jan 2020

- Recruit and manage team • Direct other teams on projects related to Infrastructure and Agricultural Monitoring.
- Implemented **Conditional GAN+Self Attention+Perceptual Loss** Model for Road Segmentation.
- Led creation/labelling for proprietary **Indian Road Segmentation Dataset** with 4500 Satellite Imagery Tiles.

PIXXEL

Bengaluru, India

Research Intern

Sep 2018 - Feb 2019

- First-hand experience/self-training in literature review, deep learning on the cloud, and **processing huge satellite datasets**.
- Implemented the **LinkNet segmentation model** for Road Segmentation from Satellite Imagery.

INDEPENDENT RESEARCH

SIAMESE TRANSFER

Pilani, India

Transfer Learning for modified Siamese Nets

Project Website • Jan 2020-Present

- Objective: Adapting Resnets for Siamese Training with transfer learning.
- Additional Objective: Implement core components in <20 lines of code to make proposed method accessible and reproducible.
- Current Results: Achieved 89% zero-shot Classification Accuracy on Imagenette(Subset of Imagenet by FastAI).

MODIFIED BATCHNORM FOR IMPROVED GENERALIZATION

Pilani, India

Eliminate mean and variance parameters to reduce dependence on incoming data distribution Project Website • Dec 2019-Present

- Created framework to modify Batchnorm layers in off-the-shelf pre-trained models with pre-training benefits hugely retained.
- Achieved 95% accuracy on Imagenette(subset of Imagenet by FastAI) in 8 epochs with a pretrained modified Resnet34
- Project shelved in favor of Siamese Transfer for now.

SELECTED PROJECTS

- **Road Segmentation with Conditional GAN+Self Attention+Perceptual Loss**: Dataset: SpaceNet + Massachusetts Roads + Deepglobe. Adapted Jeremy Howard's NoGAN technique(involves Perceptual Loss by Fei Fei Li) for instance segmentation to successfully eliminate noise, gaps and artefacts from road center-lines and increase smoothness.
- **Paper Implementation**: Implemented **Geoffrey Hinton's Lookahead Optimizer**. Achieved **highest validation accuracy** compared to SGD, AdamW on CIFAR10, CIFAR100, Imagenette(<Imagenet) • **Lookahead+OneCycle+Mixup** achieved identical results.
- **Kaggle Competitions**:
 - **Human Protein Atlas Image Classification**: 4 Channel, 29 classes, **Accuracy: 88%, fbeta:0.412**. Used:4-Channel Resnet34
 - **Toxic Comments Classification**: 6 Classes, **Accuracy:99.26%, ROC- AUC:98.7%**. Used: FastAI's ULMFIT Approach
- **Java-ML**: Independently implemented a modular, completely extendable **neural network library in Java** from scratch with **PyTorch-like interface** (no 3rd-party libraries used). Implemented: Basic **Autograd**, initialization(**Kaiming He**, Gaussian, Random), Activation funcs:relu, sigmoid, tanh, tansigmoid, etc, Matrix ops, generators, optimizers, loss functions:softmax and cross-entropy.
- **Fast Callbacks**: callbacks for FastAI V1 to better support training large models on huge Satellite datasets. Implemented: Gradient Accumulation, Skip N Batches of training, Save every N batches(extremely useful for datasets where 1 epoch > 1 hour)

SKILLS

- **Programming**: Python, C, SQL, Java, MATLAB, HTML, CSS.
- **Technical**: PyTorch, FastAI, Scikit-learn, OpenCV, GCP, AWS, Flask.