

Nithish Divakar

Computer Vision Research Engineer

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Current position

Research Engineer, Cogknit Semantics, Bangalore

Areas of specialisation

Deep Learning algorithms for Computer Vision

Education

2016-2017 PhD Candidate in Dept. of Computational and Data Sciences, IISc Bangalore
2013-2015 Mtech in Computational Science From IISc Bangalore
2009-2013 Btech in Computer Science from Govt. Engineering College Idukki

Work Experience

2017 to date Research Engineer, Cogknit Semantics, Bangalore
2015-2016 Research Assistant, VAL Lab, IISc Bangalore

Software and frameworks

■ python ■ tensorflow ■ numpy ■ keras ■ opencv
■ pandas ■ Flask ■ jupyter ■ C
□ javascript □ d3js □ reactjs

Skills Repertoire

Object Detection

- Trained an object detection model from scratch for *MiDAS* project. The model can detect 2000+ distinct object categories and the entire pipeline has been written in `tensorflow`.
- The inference pipeline of the same model was optimised to remove redundant operations and take in image as batches. This inference pipeline was then developed as a RESTful micro service using *Flask* and deployed in cloud service.

Image Captioning

- Optimised inference pipeline to do batched inference of a custom trained image captioning model for *access.ai* project.
- The original implementation was an ensemble of base models which made batch inference challenging to implement.
- Developed the pipeline as a RESTful service which can be readily deployed.

- The model was used as part of larger system which generated video descriptions. the body of work for this module is published as [1].

Image Classifiers

- Have trained numerous image classifiers for different use cases. Have used techniques ranging from fine-tuning existing model to building new model from scratch.
- Developed a bootstrapping technique to get a classifier model and labeled training data when no labeled data is available.
- Can write the entire pipeline in `tensorflow` or `keras` .
- Developed entire DNN classifier in pure `numpy` including training code.

GANs

- Have successfully developed an image reconstruction model using adversarial training. The work got published as [3]
- Was successful in using the same technique for speech denoising/reconstruction which also resulted in a published work [2]

Tensorflow

- Have developed numerous training and inference pipelines for variety of problems
- Have developed optimised input pipelines for small and large datasets.
- Have written image classifiers, captioning models, GANs and object detectors in `tensorflow` .

OpenCV, Keras and others

- Extensive experience in using `opencv` for image processing tasks especially for the augmentation work for deep learning.
- Also used `opencv` for standalone projects related to optical character recognition (OCR) and text spotting.
- Have used `keras` framework for prototyping ideas to building full sized models. Have some minor contribution to the official library.
- Have basic knowledge in other frameworks like `Flask` and `redis` which helps in developing deep learning models as a RESTful service.

Projects

MiDAS

2018 This project provides video *Meta Data as Service*. The meta data involves features of a scene like location, objects present, people present(including identification), what is spoken, different sounds that can be heard etc.

Access.ai

2017 *access.ai* converts a video to context. The team of 10 built a system which extracted vision and speech information from a video to generate a two stream descriptions. A rich Speech description involving what was spoken and other other sounds. The video description part contains an semantic description of what transcribed in the video in a given duration. The worked on video description part has been published as [1].

Image Denoising using Generative Adversarial Networks

2017 This project involved solving the image reconstruction problem using adversarial networks. A novel architecture was developed and trained from scratch using GAN technique to solve this problem. The work is published as [3]

Accelerating Image Denoising using GPUs

2016 Developed a approximation scheme which lead to 100x increase in speed up for *Non-local means image denoising* algorithm. The developed algorithm was targeted to have many patterns which make it very apt for a GPU like architecture. The work has been published as [4].

Publications

- 2018 [1] Abhay Kumar, **Nithish Divakar** and Anuroop Iyengar. “Domain Adaption of image Captioning Model for Video Descriptions” In *NVIDIA GPU Technology Conference GTC 2018*.
- 2018 [2] Laxmi Pandey, **Nithish Divakar**, Krishna D.N and Anuroop Iyengar. “Deep Clean: GPU powered Speech Denoising using Adversarial Learning” In *NVIDIA GPU Technology Conference GTC 2018*.
- 2017 [3] **Nithish Divakar** and R Venkatesh Babu. “Image Denoising: and Adversarial approach”. In *CVPR workshop on NTIRE. 2017*.
- 2016 [4] **Nithish Divakar** and R Venkatesh Babu. “Denoising in a Jiffy: A fast and GPU friendly algorithm for image denoising”. In *International Conferences on Signal Processing and Communications (SPCOM)*. IEEE. 2016.
- 2015 [5] **Nithish Divakar**. “Primal Dual Affine Scaling on GPUs”. In arXiv preprint arXiv:1502.03543

Talks and Tutorials

- July 2018 *Make your own DL framework* at anthill workshop.
url: <https://anthillinside.in/2018-july-dl-framework>
- June 2017 *from tensorflow import learn* at tensorflow workshop, IISc Bangalore organised by IEEE chapter
- July 2016 *Learning with Neural Networks* at R V College of Engineering