Dhruv Jawalkar

2nd Year Student, M.S in Computer Science at Oregon State University

Specializing in Computer Vision

Graduate Teaching Assistant

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SKILLS

2 years of experience in building projects in the field of Computer Vision and Deep Learning. I also read and try to keep up with the latest research in the field, my topics of familiarity include Semantic and Instance Segmentation, Scene Understanding, Object Detection, Depth Prediction, Pose Estimation, Image generation using GAN's, Image Retrieval. Classical techniques in Computer Vision like Epipolar Geometry, RANSAC, feature detectors, descriptors and matching.

Programming Languages : Python, C++, JavaScript, Bash, HTML, CSS

ML Stack : PyTorch, TensorFlow, NumPy, Pandas, Scikit-Learn, TensorFlow.js, Jupyter Notebook, OpenCV, Flask, Matlab

Software and tools : Git, Visual Studio, WebStorm,
Cloud Computing : Paperspace, Amazon Web Services (AWS) (For training DL models)

PROJECTS

2D Human Pose Estimation : OpenPose - Realtime Multi-Person 2D Pose Estimation using Part Affinity Fields

PyTorch, Python, Jupyter Notebook, MS-COCO dataset, AWS

Implemented the paper for understanding of developing and training a deep Convolutional Neural Network architecture on a large dataset, MS-COCO (~100,000 images) in a cloud instance. Model architecture, PAF, joint heatmap calculation and loss function have been taken from the paper, inferred joints have been matched using Hungarian algorithm. Trained model weights along with implementation code has been open-sourced on Github, effective results can be seen on sample images and a video clip.

Pose Guidance System: Guiding user through a pose routine by doing real-time 2D Human Pose Estimation

PyTorch, OpenCV, Python

Developed a lightweight network which allows inference at 5-10 frames per second on a CPU as well.
We brokedown the routine into intermediate key frames.
Provided guidance by measuring differences in relative angles between limbs.

Depth Prediction: Depth Prediction from Single Image using Multi-Scale Deep Network

PyTorch, Python, Jupyter Notebook, OpenGL, NYU Depth Dataset

Developed the model from a paper for the project idea of converting 2D videos to 3D.

The network would predict depth for each frame in the video after training on the NYU Depth Dataset. We combined the 2D image frame with predicted depth channel and tried to render in 3D using OpenGL.

Crop Growth Monitoring: Hydroponic Farming

OpenCV, Python, Scikit-Learn

Developed an application which tracks crop growth by separating plants from background and measuring growth from a webcam feed.
Models how inputs like nutrients in solution, humidity, temperature, light duration affect crop maturity and time to market.

Image Retrieval

Python, SIFT keypoint detector, CNN feature descriptor, Hungarian Algorithm

Given a query image calculated keypoints, its feature descriptors to obtain top 5 similar images from a dataset.

Yoga Poses Image Dataset Collection Tool

Python, TensorFlow, Jupyter Notebook

Inorder to create an image dataset of ~6000 images for a CNN classification model, developed a tool to download google image search results from a list of pose names and cropout the person of interest using TensorFlow Object Detection API

Computer Vision Blog : Scene Understanding (PSP Net), Semantic and Instance Segmentation (Mask-RCNN), GAN's (pix2pix, pix2pixHD, vid2vidHD, CycleGAN)

Flask, Python, NGINX, React, HTML/CSS

Blog explains paper contributions, novelty overview, method of approach, improvements on previous work and model results

Embodied AI: Visual Navigation based Environment Exploration

PyTorch, Python, Gurobi Optimizer, Jupyter Notebook

Developed baseline for efficient exploration of a 2D grid tunnel map under fuel constraint for a robot.
Formulated efficient exploration as a Travelling Salesman Problem, least cost tour covering all nodes.
Added fuel constraint reduced it to an Orienteering Problem with limited budget to cover all nodes.
Formulated all constraints in the Gurobi Optimizer to obtain an optimal solution to efficiently explore the map given limited fuel.
https://www.youtube.com/watch?v=eGDtGmRTzaQ

PAST EXPERIENCE

Kony Labs, India - *Senior Software Development Engineer* **Dec 2016 - Jun 2017**

Angular, React, JavaScript, HTML, CSS, JAVA

- Part of MBaaS (Mobile Backend as a Service) console team, was responsible for improving console performance and user experience.

Engage BDR, India - *Software Development Engineer* **April 2016 - Dec 2016**

Angular, JavaScript, HTML, CSS, Grunt, Yeoman, Bootstrap

- Lead front-end development for upcoming product ICONICREACH, platform to connect brand advertisers to Instagram celebrity influencers.

Fission Labs, India - *UI Engineer* **Aug 2013 - April 2016**

Angular, JavaScript, Highcharts, HTML, CSS, Grunt, Yeoman, Bootstrap

- Built web apps for silicon valley Ad-Tech startup, DeepForestMedia.
- Developed their DSP portal used for online Ad Campaign Management.
- Developed campaign performance monitoring dashboard, crucial to customers in making effective business decisions.

EDUCATION

Oregon State University, USA Sept 2018 - Current (GPA : 3.77)

M.S in Computer Science (Software Innovation Track)

BITS-Pilani, India Aug 2009 - July 2013

B.E Hons. in Computer Science

RELEVANT COURSEWORK

Computer Vision I, Computer Vision II (Advanced), Deep Learning, Embodied AI, Algorithm Design and Analysis, Software Engineering Methods