Kaunil Dhruv

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RESEARCH

COOPERATIVE INSTITUTE FOR RESEARCH IN ENVIRONMENTAL SCIENCES | Independent Research
June 2019 – Present | Boulder, CO

- Collaborating with Dr. Michael John Willis at CIRES on HPC implementation of CV techniques such as Image Mosaicing and 3D reconstruction using CUDA.
- Trained and optimized (60x compared to original implementation) a UNet based semantic segmentation model for high resolution Synthetic Aperture Radar Imagery to delineate bedrocks in Antarctica using mixed precision training in PyTorch.

INSTITUTE OF COGNITIVE SCIENCE | Graduate Research Assistant
May 2019 – Present | Boulder, CO & Syracuse, NY

- Working with Dr. Leanne Hirshfield at the SHINE Lab on Cognitive Science and Deep Learning (LSTMs and 3D-CNNs) for Multi-Label classification of fNIRS data to predict human cognitive workload.
- Researched and implemented a ConvLSTM based Siamese Neural Network to predict cognitive workload of a 50 time step 5x24 fNIRS data input.
- My work at I.C.S. also involves research and development of a multi-modal cognitive workload estimation system under a Simulated Aircraft Piloting task.
- You can learn more about my work here.

EXPERIENCE

INSYLO TECHNOLOGIES SLU (CONTRACT) | Computer Vision Intern
March 2018 – June 2018 | Girona, Spain

- Developed a computer vision pipeline for volumetric estimation of Silos with the help of 2D monocular and RGB-D images.
- Researched and implemented: Depth from Focus, planar geometry reconstruction using Laser Mesh Projection.

FACEBOOK | Software Engineer in Connectivity Labs and A.M.L
Sept 2016 – Dec 2017 | Menlo Park, CA & Mumbai, India

- Researched and implemented a pipeline for visualizing learned features of VGG-16, SegNet, and UNet based semantic segmetation architectures.
- Developed data annotation tools using Qt5 (c++) used by a team of G.I.S Analysts for enhancing the generalization of semantic segmentation models using Active Learning paradigm.
- Designed & deployed an Android App using an R-Tree based back-end to validate predicted road geometries.
- All the codes are open sourced and maintained at github://facebookresearch/street-address.

ISENSES INC. | Research and Development Intern
Dec 2015 – Jan 2016 | Mumbai, India

- Developed a machine learning pipeline for Disguised Face Detection from 2D images.
- Implemented a SegNet based feature detector to identify facial action units which were then used to classify disguised faces using an S.V.M loss based classifier.
- Entire pipeline was optimized and implemented on a an FPGA and materialized into a product.

EDUCATION

UNIVERSITY OF COLORADO BOULDER | ms in Computer Science
Expected May 2020 | Boulder, CO • Cum. GPA: 3.54
RelevantCourses: Advanced Robotics • Machine Learning • Computer Vision • Natural Language Processing • Advanced Computer Graphics • Big Data Analytics

UNIVERSITY OF MUMBAI | B.E. in Computer Science
Aug 2013 - May 2017 • Cum. GPA: 7.0/10.0

RELEVANT PROJECTS

PARTICLE ATTRACTOR | Optical Flow simulation using Particle Engine in OpenGL 4.4 using CUDA.
CUDA-CV | CUDA implementation of Computer Vision algorithms.
TENSOR LIB | CUDA implementation of NumPy based Tensors in C++ 17.
FEATURE BASED SLAM | Python implementation of Feature Based SLAM on monocular images.
COBRIX | Computing Interface for the visually impaired to learn computer programming.
DISGUISED FACE DETECTION | Live demo of my work at iSenses Inc.
MEDICAL REPORTS DIGITIZER | Android Application to scan and digitize user's medical reports using CV and Tesseract OCR.

PUBLICATIONS

- Kaunil Dhruv, Trevor Grant, Lucas Hayne, Leanne Hirshfield. "Taking a Deeper Look at the Brain with High-Density fNIRS: Predicting Discrete Components of Cognitive Load with Deep Learning and Model Transparency Techniques". SIGCHI 2021, Submitted for peer review.
- Ilke Demir, Forest Hughes, Aman Raj, Kaunil Dhruv , Suryanarayana Murthy, Sanyam Garg, Barrett Doo, Ramesh Raskar. "A Holistic Framework for Addressing the World using Machine Learning". CVPR 2018 workshops.
- Ilke Demir, Forest Hughes, Aman Raj, Kaunil Dhruv , Suryanarayana Murthy, Sanyam Garg, Barrett Doo, Ramesh Raskar. "Generative street addresses from satellite imagery". International Journal of Geo-Information (ISPRS 2018).
- Ilke Demir, Forest Hughes, Aman Raj, Kleovoulos Tsourides, Divyaa Ravichandran, Suryanarayana Murthy, Kaunil Dhruv , Sanyam Garg, Jatin Malhotra, Barrett Doo, Grace Kermani, Ramesh Raskar. "Robocodes: Towards Generative Street Addresses from Satellite Imagery". CVPR 2017 workshop on Earthvision. (best paper award)

SKILLS

PROGRAMMING
python | c++ > 11 | MATLab
TOOLBOXES
Ceras | Eigen | libtorch
DEEP LEARNING FRAMEWORKS
pyTorch | | Chainer | LuaTorch
WEB FRAMEWORKS
ReactJS | D3.js | AngularJS | Deck.GL
BIG DATA
Apache Spark | Hadoop | Hive