Saksham Jindal

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EDUCATION

Indian Institute of Technology, Kharagpur **July 2018**
M.Tech. and B.Tech. in Ocean Engineering and Naval Architecture CGPA: 8.20/10.0

PROFESSIONAL EXPERIENCE

Fractal Analytics, London (UK) **June 2018 – Present**
Data Scientist | Machine Learning Engineer AI@scale, Computer Vision and Conversational AI

Research and Development of scalable products and prototypes in Computer Vision
- Product information extraction using image instance segmentation and OCR for a retail client
  - Designed and developed automated product identification model with ~20 brands of the client in advertisement pamphlets using deep learning based layout-segmentation and image classification algorithms for extraction of products
  - Implemented incremental learning for scaling up batch training for new classes and reduced training time by 60%
  - Operationalized framework enabled automation in business workflow by eliminating ~200 man-hours monthly
- Surveillance using object detection on aerial images using inference optimized single-stage methods
  - Architected a multi-dataset and multi-network object detection experimentation framework with scalable and reproducible pipelines for image pre-processing, distributed training, inference generation and model deployment
  - Developed several models based on backbones of Yolov3 and RetinaNet and benchmarked on VisDrone-2019 dataset
  - Optimized the performance of YOLOv3 fine-tuned to detect small and medium objects with implementation of mixed precision training and researched on model quantization for latency optimization and increase in inference speed
- Product placement context understanding using scene classification in images for a CPG client
  - Spearheaded the development of an image classification capability to categorize indoor scenes (8 classes) in the image
  - Developed a fully retrained model based on Resnet-50 and Resnet-101 to classify scenes at various scales and layouts
  - Optimized the performance by multi-class multi-scale training with cosine annealing schedule on learning rate
- In-house attendance tracking system using facial recognition and face tracking
  - Designed and deployed a facial recognition and tracking system for over 1000+ employees across 3 locations in India
  - Developed FaceNet based face-verification model for few-shot representation learning of face embedding using online hard triplet negative mining (triplet loss) and facial recognition using image classification on the feature embeddings

OPEN-SOURCE PROJECTS

- *Unsupervised framework to capture visual and spatial embeddings on multi-view CLEVR dataset [code][doc]*
  - Developed a framework to construct scene graph from visual and spatial prototypes from a single RGB image
  - Initialized the embeddings from masked object ROI pool features (visual) and concatenation of connecting node features (spatial) conditioned on ground truth egomotion refined further by momentum contrastive learning framework
- *Real-time stereo visual odometry and camera pose estimation with local bundle adjustment [code]*
  - Implemented a pipeline for incremental estimation of 6-DOF ego-motion using video stream of the moving camera
  - Employed techniques included feature matching, outlier rejection using RANSAC, feature tracking across time instants, 3D reconstruction of point cloud, pose estimation (PnP algorithm) and local pose refinement using Bundle Adjustment
- *Road lane marking detection for autonomous driving benchmarked on BDD dataset [code]*
  - Developed training and inference pipelines for experimentation with deep learning architectures for real-time semantic segmentation (Deeplabv3, SCNN, Enet), different loss functions to handle class imbalance and learning rate schedulers
  - Initiated experiments with the architectures and loss functions to benchmark on BDD100K dataset for lane detection
- *Real-time monocular visual SLAM and pose-graph optimization with g2o framework [code]*
  - Implemented a pipeline of monocular SLAM for feature tracking, pose prediction, pose refinement and 3D visualization

PUBLICATION

J.Pradhan, **S. Jindal**, B. Mahato, Y.G. Bhumkar, *"Joint Optimization of the Spatial and the Temporal Discretization Scheme for Accurate Computation of Acoustic Problems",* Communications in Computational Physics, 24 (2018), pp. 408-434

SKILLS, TOOLS & FRAMEWORKS

- *Languages* : Python, C, C++
- *Deep Learning in Computer Vision* : Pytorch, Tensorflow, Keras
- *Containerization, Orchestration and Deployment* : Docker, Django, Flask, Nginx, Kubernetes, Airflow, Git
- *Machine Learning and Image Processing*: Numpy, Pandas, Scikit-learn, Statsmodel, Scipy, Jupyter, OpenCV, Pillow
- *Relevant Courses Undertaken* : Linear Algebra, Data Structure and Algorithms, Graph Theory, Probability and Statistics