Saksham Jindal

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EDUCATION

University of California, San Diego **Sep 2022 - Present**
M.S. in Electrical and Computer Engineering (Robotics & Machine Learning)

Indian Institute of Technology, Kharagpur **Jul 2013 - Jun 2018**
B.S. and M.S. in Ocean Engineering and Naval Architecture

RESEARCH EXPERIENCE

Advanced Robotics and Controls Lab, UC San Diego (Prof. Michael Yip) | *Graduate Research Assistant* **Jan 2023 – Present**

- Currently working on development of building **3D vision-based forward dynamics** model for goal conditioned robotic manipulation
- Worked on building **SE(3) equivariant** and **deformation invariant** neural representations for manipulation of deformable objects

Robotics Research Center, IIIT Hyderabad (Prof. Madhava Krishna) | *Visiting Researcher (Part-time)* **Apr 2021 – Dec 2021**

- Implemented framework for online incremental **localization** and **mapping (SLAM)** for indoor **3D** scenes using implicit representation formulated by **neural radiance fields (NeRF)** and finding **relative pose** between NeRF submaps [code]

PROFESSIONAL EXPERIENCE

TomTom Maps (Pune, India) | *Senior Data Scientist - Map Making Platform* **Nov 2021 - Aug 2022**

- Deployed **vision transformers** (ViT) based **semantic segmentation** and **point cloud registration** models for aerial **perception**, integration and maintenance of road geometry using satellite image data for TomTom's navigation maps [link]
- Implemented pre-processing, trajectory segmentation and feature engineering on GPS data from vehicles and developed **classification** models using **gradient boosting machine learning** models - **XGBoost** and **LightGBM** for **24+ cities** from **10 countries**

Fractal Analytics (London, UK) | *Machine Learning Scientist - Computer Vision, NLP & Forecasting* **Jun 2018 - Oct 2021**

- Led a team of data scientists for automated product information extraction using **deep learning** based **instance segmentation**, **image classification**, **active learning** and **incremental learning** for scaling up data annotation and reducing batch training time by **60%**
- Configured **object detection** framework based on **Yolov3** and **Yolov4**, optimizing the performance of models **fine-tuned** to detect small and medium objects and low latency with **1.5x increase** in inference speed
- Developed **image classification** models categorizing indoor scenes (8 classes) using transfer learning on **Resnet-101** and **SE-Resnet-50** models using multi-label and multi-scale training for indoor **scene understanding**
- Designed a customer 360-degree view of **3 million** advertisement impressions, devised KPIs for evaluating linear and gradient boosting ML models to analyse the impact of **advertising touch points** and build strategies for targeted advertisement campaigns
- Deployed **time series analysis** and **forecasting** models to predict churn rate for 2 million customer base and orchestrated **MLOps CI/CD** pipelines for data transformation**,** feature engineering, model training and inference on **Google Cloud Platform (GCP)**

OPEN-SOURCE PROJECTS

- Developed pipeline for personalized text-to-image generation and editing using latent **diffusion** models (**generative AI**), incorporating **LoRA finetuning** for image generation and **cross-attention** guidance for image editing [code][paper]
- Implemented a **Visual SLAM** pipeline for 6-DOF camera pose estimation and outdoor scene mapping using techniques in **multi-view geometry - RANSAC**, **feature tracking**, **3D reconstruction**, **pose estimation** (PnP algorithm) and **bundle adjustment** [code]
- Developed framework for extraction of road geometry from satellite images using **convolutional neural network (CNN)** based **semantic segmentation** architectures experimenting with data augmentations, schedulers, optimizers and loss functions [code][paper]
- Created **Particle Filter SLAM** pipeline using IMU odometry data and **LiDAR** scans from sensors mounted on the differential drive robot to enable localization and build **occupancy grid map** of the environment [code][paper]
- Programmed **variational auto-encoder** (**VAE**) to generate chest X-Ray medical images of patients with pneumonia [code][report] and **deep convolutional GAN** (**DCGAN**) for generating realist image of artwork [code][report]
- Worked on **orientation tracking** of a rotating body using quartenion kinematics on IMU data, constrained optimization using **Riemannian stochastic gradient descent** and generating 360-degree spherical panorama of the indoor scene [code][paper]
- Researched on momentum **contrastive learning** to build view invariant visual and view-dependent spatial object centric embeddings in order to build scene graph on multi-view CLEVR dataset [code][doc]

SKILLS, TOOLS & FRAMEWORKS

- **Python**, C, C++, MATLAB, **SQL**, **Pytorch**, **Tensorflow**, Keras, **Pytorch Lightning, OpenCV**, **Docker**, **Git (Version Control),** Fast API, Django, Flask, **AWS**, **Azure**, **GCP**, Airflow, **BigQuery, Jenkins**, **Numpy**, **Pandas**, **Scipy**, **Scikit-learn**, Matplotlib