Suraj Sudhakar

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Education

Saarland University **April 2021 – Dec 2023**
Master of Science in Visual Computing *Saarbruecken, Germany*
GPA: 1.8 (Indian equivalent GPA 8.6)

BMS College of Engineering **Aug 2014 - Jul 2018**
Bachelors in Electronics & Communications *Bangalore, India*
GPA: 8.88 (out of 10, German Equivalent GPA 1.6)

HJKP college **2012-2014**
Pre-university degree *Bangalore, India*
GPA: 94.08%

Relevant Coursework

- **Neural Networks**
  (SVM, MLP, CNN, LSTM, Transformers)
- **Computer Graphics**
  (Ray tracing, Renderer, Monte-Carlo sampling)
- **Mathematics**
  (Linear Algebra, Statistics, Probability)
- **Computer Vision**
  (Camera models, Stereo estimation, Variational methods)
- **Artificial Intelligence**
  (Planning, Constraint Programming, Search Heuristics)
- **Advanced Image Analysis**
  (Inpainting, Tone mapping)

Research

Online Monocular 3D reconstruction using point clouds | *Python, CUDA, Pytorch, Blender* **Jan 2023 - Dec 2023**

- Topic of my Master thesis: developing a novel method to perform **3D reconstruction using point clouds** to solve the problem of scene flow for occluded points
- Two point cloud observations from different time instances are registered **using scene flow** and fused to obtain the reconstructed surface. The surface is obtained as a signed distance function (SDF) and later converted to a mesh.
- Extensive literature review was performed to identify the shortcomings of existing methods
- We identified the key challenges beforehand and designed toy experiments to simulate the problem and possible solutions
- Utilized existing research on scene flow (FlowNet3D) for point cloud and modified it for our problem statement
- Performed extensive experiments on datasets like DeformingThing4D, Deepdeform to test and prove the concept (We expect to publish the results soon)

Work student (Research Assistant)

CVMP Lab - Computer Vision and Machine Perception Lab **Oct 2022 - Nov 2023**
HiWi (part time) | Python, c++, Pytorch, Docker, Blender *Saarbruecken, Germany*

- The job entailed a variety of tasks at the newly established lab
- Setting up datasets which consisted of **visualizing, writing dataloaders**, maintaining folder structure, and overall streamlining of datasets to enable smooth research for the Lab
- **Creation of point cloud dataset using RGB videos**
- The steps in creating dataset involved camera calibration, april tag based ground plane detection, processing using COLMAP, and segmentation
- Ran LangSAM model which is a variant of SegmentAnything Model (SAM) that takes in text token inputs to generate masks.
- Point cloud for the object was extracted from the complete point cloud. The pipeline was generalized for future data collection tasks. Link
- Implemented toy example of DeepSDF paper to help the professor create assignments for the upcoming lecture

ZeMA Labs - Zentrum für Mechatronik und Automatisierungstechnik gemeinnützige **July 2022 – Oct 2022**
HiWi (part time) | MATLAB *Saarbruecken, Germany*

- Was responsible for capturing the **precise 3D location (localization)** of a finger shaped robot, the 3D coordinates were later used by other researchers to verify kinematic formulations.
- Setting - Controlled environment, Marker based tracking, Offline. Multiple locations on the robot on the robot were installed with markers and video was captured using a stereo setup under controlled lighting conditions

- The video was processed offline, The markers were identified on the robot and the precise 3D location was triangulated
- To estimate the center of the robot, the ellipse of the cylindrical robot was estimated and focal point was determined.

Projects

Exercise Posture Classification using Pose Estimation | *Pose estimation, Classification,* ***Github Link*** **May 2021**

- As a part of our High level computer vision course work - Categorizing posture quality during exercise into good and bad postures by using Pose Estimation, as a use case we chose the exercise of deadlift
- Involved comprehensive data collection and annotation phases
- Tested several models (UniPose, OpenPose, Omnipose) on the dataset for implementation
- Keypoints were estimated while performing the exercise under varying positions and the resulting skeletal was used to classify the posture into good & bad

Re-identification: Signature Fraud Recognition | *Tensorflow, Computer Vision* **Dec 2018**

- As a part of my bachelor thesis - Designed a Convolution Neural Network system that verifies the user signatures
- A simple CNN-based model was trained on a signature database to learn the right features
- Original signature from the database and the test case were both processed using this trained model and compared in feature space
- User signatures were then verified, thus performing Re-identification for the test case signature
- We published the work at **IEEE conference (link)**

Speaker Independent Spoken Digit Recognition | *NLP, Classification* ***Github Link***

Submission for Ray tracing Rendering competition | *Graphics, C++, Simulation* ***Github Link***

Generalization Analysis of Deep Frank Wolfe Algorithm | *Optimization Analysis* ***Github Link***

Experience

Profinch Solutions **July 2020 – Jan 2021**

Software Engineer, Consultant *Bangalore, India*

- Worked as a database software developer using SQL for banking software, Flexcube
- Developed front end web pages using Rapid application development tool and wrote the backend modules for them using SQL
- Created triggers to query, update tables and to maintain Data Integrity
- Involved in frequent client meetings and communication of updates

Oracle Financial Services Software Limited **August 2018 – August 2019**

Software Engineer, Associate Consultant *Bangalore, India*

- Joined in as a fresher and worked on the same banking software in the consultancy team
- Was able to quickly contribute by fixing critical bugs and handle customizations in major projects
- Worked extensively on CASA & CL (customer account and lending respectively) modules in Flexcube

Technical Skills

Languages: Python, Oracle SQL, C++, CUDA, MATLAB, JavaScript
Tools/Softwares: Blender, Linux, VS Code,GitHub, HTCondor, Docker, Jupyter Notebook, Oracle Flexcube, WordPress
Python Libraries: Pytorch, Pytorch3D, Numpy, OpenCV, Open3D, Matplotlib, Pandas
Soft skills: Analytical problem solving, communication skills, problem solving
Natural Language: English(C1), German(A1)