PRANSHU PANT

ppant@andrew.cmu.edu | 412-626-2656
linkedin.com/in/pranshupant | github.com/pranshupant

EDUCATION

Carnegie Mellon University (CMU) **Pittsburgh, PA**
Master of Science in Mechanical Engineering - Research *May 2021*
Relevant Courses: *Deep Learning, Computer Systems, Numerical Methods, Computer Vision, CFD, FEM, DS and Algorithms*
GPA - *4.0/4.0*

Delhi Technological University (DTU) **New Delhi, India**
B. Tech, Mechanical Engineering | First Class with Distinction *Jun 2018*

WORK EXPERIENCE

The MathWorks, Inc. **Natick, MA**
Engineering Development Group (Intern & Fulltime) *May 2020 - Aug 2020 & Jul 2021 - Present*

- Worked with the Computer Vision Team on implementing deep learning based human pose estimation algorithms.
- Worked with the Graphics Infrastructure Team for developing C++ converter for interactive export of MATLAB figures.
- Deployed a client-side JavaScript viewer for interacting with MATLAB figures without a server-side MATLAB instance.

Indian Institute of Science **Bangalore, India**
Project Assistant *Aug 2018 - Apr 2019*

- Coupled PDE solver - CFD: OpenFOAM, with optimization heuristics to perform parametric shape optimization.
- Implemented deep learning model to simulate CFD data and parallelized execution to reduce computational time.
- Developed a JavaScript interface for visualising iterative optimisation and displaying performance metrics.

LEADERSHIP EXPERIENCE

Team Leader, Team Defianz Racing - Formula Student Team, DTU *Aug 2016 - Feb 2018*

- Led team to its best position till date at Formula Student Bharat - 2nd overall.

PROJECTS

Deep Learning for Reduced Order Modelling and Temporal Evolution of Fluid Simulations *Nov 2020 - Apr 2021*

- Developed a deep learning framework (DL-ROM) for efficiently predicting future timesteps of fluid simulations.
- Deployed a convolutional 3D-UNet based encoder-decoder architecture on the processed CFD simulation data.
- Performed temporal evolution on the learned reduced order embeddings; decreased iteration times by 2 orders of magnitude.

Sematic Segmentation for Autonomous Driving *Jan 2021- Feb 2021*

- Performed semantic segmentation on the CityScapes dataset for semantic understanding of dense urban street scenes.
- Implemented a U-Net extension for the DeepLabV3 network with dilated and depth-wise separable convolutions to boost performance.
- Achieved a mean IOU of 0.7815 on the test set.

Deep Learning for Efficient Reconstruction of High-Resolution Turbulent DNS Data *Feb 2020 - Aug 2020*

- Performed super-resolution reconstruction of high-resolution CFD data from low-resolution data.
- Developed a deep learning model (SR-DNS Net) combining architectures like MobileNets, U-Nets and Pixel-Shuffle layers.
- Reduced training times by a factor of 4; implementing transfer learning and utilizing depth-wise convolutions.
- Achieved significant improvement in image similarity metrics (PSNR and SSIM) b/w reconstruction and ground truth.

N-Body Simulator *Mar 2020 - May 2020*

- Designed a cross-platform C++ based simulator for visualizing interactions between large number of independent objects.
- Modelled N-body interaction systems such as gravitational attraction and spread of infectious diseases.
- Utilized OpenMP to perform parallelization and OpenGL to visualize the interactions.

Cascading Convolutional Neural Network *Mar 2020 - May 2020*

- Developed a novel convolutional extension to the Cascading Correlation (CASCOR) neural network architecture.
- Dynamically updated network topology by progressively adding hidden units during training.
- Implemented algorithm to sample and add convolutional hidden units showing maximum correlation with the error signal.

SKILLS

Programming Languages: Proficient: Python, C, C++ | **Familiar:** Java, JavaScript, HTML/CSS, SQL.
Software & Packages: PyTorch, TensorFlow, MATLAB, OpenFOAM, Arduino, Git.

PUBLICATIONS

- Pranshu Pant, Ruchit Doshi, Pranav Bahl, and Amir Barati Farimani, "Deep learning for reduced order modelling and efficient temporal evolution of fluid simulations", Physics of Fluids 33, 107101 (2021) https://doi.org/10.1063/5.0062546