Mohit Gupta

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EDUCATION

PhD in Machine Learning & Civil Engineering *Aug 2021 - Aug 2025*
Arizona State University, United States (*GPA: 4.0/4.0*)
Advisor: Dr. Thomas Czerniawski

M.Tech. in Design Engineering (*GPA: 9.62/10*) *Aug 2019 - May 2021*
Birla Institute of Technology and Science (BITS) Pilani, India

B.E.(Hons.) in Civil Engineering (*GPA: 9.19/10*) *Aug 2011 - May 2015*
BITS Pilani, India

RESEARCH PROJECTS

Graph-P&ID *(Pytorch)*
- Transformed engineering drawings (P&IDs) into knowledge graphs, enabling NLP queries, automated safety compliance, and enhanced information retrieval.
- Developed algorithms for symbol extraction, OCR, line detection, and relationship mapping, automating the digitization and editing process.

Addressing Domain Shifts & Class Imbalance for Object Detection in Engineering Drawings *(Fastai, Pytorch)*
- Replaced traditional *class-aware* object detection with *class-agnostic* detection followed by augmented one-shot classification. This method significantly reduces the reliance on manual annotations, enhances recall rates for minority classes and exhibits superior performance across datasets with varying distribution.

Spatio-Geometrical Accuracy of 3D Reconstruction using NeRF *(Nerfstudio, CloudCompare)*
- Performed 3D scene reconstruction from equirectangular images using Neural Radiance Fields (NeRF). Validated NeRF-generated point clouds against 3D laser scans, observing deviations of less than 1 cm for close, well-lit objects and over 5 cm for distant, poorly lit objects.

Convert 2D CAD Plans into 3D Digital Models *(Pytorch, Dynamo)*
- Performed semantic segmentation of building components in engineering drawings. After that, the outputs were post-processed to enable single-click 3D layout generation using Autodesk API - Dynamo.

EXPERIENCE

- **Research Intern**, TU Munich, Germany *May 2022 - Aug 2022*
  - Chair of Computational Modeling and Simulation, Advisor: Prof. Andre Borrmann
- **Data Analyst**, THDC India Limited, India *June 2016 - July 2021*
  - Developed a predictive maintenance model using time-series analysis to detect anomalies in turbine vibrations, achieving a 92%+ true positive rate (Reduced turbine downtime by over 20 days annually).
- **BIM Engineer**, Vconstruct Private Limited, India *May 2015 - July 2016*

HACKATHONS

Kaggle: Predict CO2 Emissions in Rwanda
- Ranked 6th among 1453 teams in developing a time-series forecasting model for predicting CO_2 emissions.

Kaggle: ICR-Identifying Age-Related Conditions
- In Top 5% amongst 6430 teams in deveoping a multi-class health classifier in a class-imbalanced dataset.

PUBLICATIONS

- **M. Gupta**, R.Eiris, Robust Object detection in Engineering Drawings: Handle Distribution Shifts & Class Imbalance *(submitted in ACCV 2024)*
- **M. Gupta**, R.Eiris, Finetune Pure Vision Models with Text Embeddings for Few-Shot Classification, ASCE I3CE, 2024.
- **M. Gupta**, C.Wei, T. Czerniawski, Semi-supervised symbol detection for piping and instrumentation drawings, Automation in Construction, 2024.
- C.Wei, **M. Gupta**, T. Czerniawski, Interoperability between Deep Neural Networks and 3D Architectural Modeling Software Affordances of Detection and Segmentation, Buildings, MDPI, 2023.
- **M. Gupta**, C. Wei, T. Czerniawski, Automated valve detection in Piping & Instrumentation drawings, ISARC 2022.
- C. Wei, **M. Gupta**, Automated wall detection in 2D CAD drawings to create digital 3D models, ISARC 2022.

CERTIFICATIONS & RELEVANT COURSEWORK

- **Coursework** - Machine Vision & Pattern Recognition, Image Informatics & Analytics, Embedded Machine Learning, Statistical Machine Learning

TECHNICAL SKILLS

- **Languages**- Python, MATLAB, C