Kshitij Nikhal

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Summary

With 6+ years of experience in AI/ML, I've contributed to various innovative projects at TomTom Maps and Google X, along with high impact research at the University of Nebraska. Specializing in moonshot initiatives, I possess an unique talent for product development from inception to production. My experience spans the entire development cycle, from delivering MVPs to scaling up for production.

Education

University of Nebraska-Lincoln May 2021 - Jan 2024
Ph.D. AI/Computer Vision (Advisor: Dr Benjamin Riggan) *Lincoln, NE, USA*

- Authored 2 journal & 8 conference papers at notable venues such as CVPR, WACV, and others.
- Research: unsupervised learning, foundational models, attention models, computer vision, domain adaptation, cross-modal learning, person/face recognition, biometrics, efficient inference.

University of Nebraska-Lincoln Jan 2020 - May 2021
M.S. AI/Computer Vision (Advisor: Dr Benjamin Riggan) *Lincoln, NE, USA*

- GPA: 4.0. Authored 1 conference paper at WACV21.
- Thesis: Learning Discriminative and Efficient Attention for Person Re-Identification Using Agglomerative Clustering Frameworks

University of Pune May 2013 - May 2017
B.E. Computer Science *Pune, MH, India*

- Grade: First Class with Distinction. Authored 1 conference paper at IntelliSys 2017

Experience

University of Nebraska-Lincoln Jan 2020 – Present
Research Assistant *Lincoln, NE, USA*

- Part of **IARPA BRIAR** program to develop whole body recognition using computer vision in challenging scenarios (500m range, atmospheric turbulence, aerial sensors, etc.).
- Part of **U.S. Army/UMD's ArtIAMAS** (AI and Autonomy for Multi-Agent Systems) program for developing efficient, dynamic, and deployable ML models, ensuring reliability in extreme environments.

Google X (Moonshot Factory) Aug 2022 – Dec 2022
AI Resident *Mountain View, CA, USA*

- Contributions: Photogrammetry on oblique aerial imagery to infer key electrical properties of power poles.
- Impact: Capability of a fine-detailed map of the electric grid (One Patent Filed).

Google X (Moonshot Factory) May 2021 – Aug 2021
AI Resident *Mountain View, CA, USA*

- Contributions: Developed a few-shot learning foundational model to rapidly identify new defects on the electrical grid using StreetView-like imagery.
- Impact: Substantial cost/time savings by eliminating manual work (One Patent Filed).

TomTom Maps Jan 2017 – Dec 2019
Software Engineer *Pune, MH, India*

- Contributions: End-to-end ML Pipeline for map feature extraction (e.g., roads, building footprints, etc,.).
- Impact: 100x time reduction of manual cartography hours.
- Contributions: Developed Graph & ML models with multi-modal data (e.g., GPS, multi-spectral imagery) to fix map inconsistencies.
- Impact: 2x more accurate, real-time map.

Patents

[1] Meta-learning for detecting object anomaly from images (Filed at Google X)
[2] Inferring Electrical Properties using Photogrammetry (Filed at Google X)

Publications

1. **Nikhal, K.**, Ma, Y., Bhattacharyya, S. S., & Riggan, B. S. HashReID: Dynamic Network with Binary Codes for Efficient Person Re-identification. *WACV 2024*
2. **Nikhal, K.**, Uzuegbunam, N., Kennedy, B., & Riggan, B. S. Mitigating Catastrophic Interference Using Unsupervised Multi-Part Attention for RGB-IR Face Recognition. *CVPRW 2023*
3. **Nikhal, K.**, & Riggan, B. S. Weakly Supervised Face and Whole Body Recognition in Turbulent Environments. *IJCB 2023*
4. Fondje, C. N., **Nikhal, K.**, et al. HBRC-500: A Long Range Recognition Benchmark Dataset using Face and Whole-body Imagery. *IJCB 2023*
5. **Nikhal, K.**, Fondje, C. N., & Riggan, B. S. Cross-Spectral Attention for Unsupervised RGB-IR Face Verification and Person Re-identification. *In Review at TIPS Journal*
6. Karl, R., **Nikhal, K.**, & Riggan, B. S. Enhanced Privacy-enabled Face Recognition using k-Identity Optimization. *In Review*
7. Ma, Y., **Nikhal, K.**, Bhattacharyya, S. S., & Riggan, B. S. Dynamically Reconfigurable Perception using Dataflow Parameterization of Channel Attention. *Invited Asilomar 2023*
8. **Nikhal, K.**, & Riggan, B. S. Multi-context grouped attention for unsupervised person re-identification. *TBIOM 2022*
9. **Nikhal, K.** Learning Discriminative and Efficient Attention for Person Re-Identification Using Agglomerative Clustering Frameworks. *Masters Thesis*
10. **Nikhal, K.**, & Riggan, B. S. Unsupervised attention based instance discriminative learning for person re-identification. *WACV 2021*
11. Hamblin, J., **Nikhal, K.**, & Riggan, B. S. Understanding Cross Domain Presentation Attack Detection for Visible Face Recognition. *FG 2021*
12. Palnak, F., **Nikhal, K.**, Verma, P., Panchani, R., & Rohankar, S. MAGEC: machine assisted geometry extraction and creation. *ICMV 2019*
13. Gite, B., **Nikhal, K.**, & Palnak, F. Evaluating facial expressions in real time. *IntelliSys 2017*

Other Projects

Super Resolution on Satellite Imagery | *Generative Networks*

- Developed capability to improve resolution and uniformity of aerial imagery across different imagery providers for map feature segmentation using generative networks (GANs) and image-to-image translation.

Indoor Position using Keypoint Detection | *Android Development, Keypoint Extraction*

- Developed a mobile application for indoor navigation using known reference objects in an office environment.

Happy Moments on TomTom Action Camera | *Support Vector Machines, Face & Expression Recognition*

- Developed capability to automatically detect happy (smiling) moments to create a personalized slideshow of 'Happy Moments' in the TomTom action camera app.

VR-Cartographers | *AR/VR, Oculus, Mapping*

- Built an application for the Oculus Rift platform, allowing cartographers to view & interact with TomTom's street level imagery data, enabling them to precisely create map features.

Street & Business Name Extraction From Street Imagery | *Text Extraction, Object/Sign Detection*

- Extracting textual information from street-view imagery to automate map changes updates.

Self-driving RC Car | *Embedded Systems, Collision Avoidance, Object/Sign Detection*

- Developed a self-driving RC car using Raspberry Pi, Arduino UNO, and Ultrasonic sensors, including features such as sign recognition and collision avoidance.

Technical Skills

Languages: Python, C++, Golang
Frameworks: PyTorch, TensorFlow, Keras
AI/ML: generative networks, foundational models, few-shot learning, clustering, unsupervised learning, transformers, recurrent networks, object detection, optical flow, depth/disparity estimation, segmentation, attention models, large language models (LLM), tracking, mapping, localization, photogrammetry.
Libraries: numpy, pandas, scikit, opencv, matplotlib, spacy

Accolades

IJCB Doctoral Consortium 2023
NSF Student Travel Grant 2023
Milton Mohr Fellowship 2022
Winner of TomTom Hackathon 2018
Winner of TomTom Innovation Day 2018
Winner of TomTom Special Jury Award 2017
Winner of TomTom Hackathon 2017