

KUSHAGRA MAHAJAN

✉ kmahajan@cs.cmu.edu 📞 +1-412-214-2036 💻 mahajan-kushagra 🌐 Kushagra Mahajan 🌐 kushagramahajan.me

EDUCATION

Carnegie Mellon University, School of Computer Science	Pittsburgh, PA
Master of Computational Data Science — GPA: 4.06/4.00	Aug. 2021 – Present
◦ Coursework: Machine Learning, Machine Learning for Large Datasets, NLP, Cloud Computing, Visual Learning and Recognition, Multilingual NLP, Multimodal ML, Best Capstone Solution Award	
Indraprastha Institute of Information Technology Delhi (IIIT Delhi)	Delhi, India
Bachelor of Technology in Computer Science — GPA: 8.78/10.00	Aug. 2014 – Dec. 2018
◦ Coursework: Computer Vision, Probabilistic Graphical Models, Data Mining, Collaborative Filtering, Machine Learning (Teaching Assistant - Fall '18), Data Structures and Algorithms, Compiler Design, Database Systems, Operating Systems.	

EXPERIENCE

Amazon	Seattle, WA
Software Engineering Intern — Installments Team	May 2022 – Aug 2022
◦ Analyzed payment failure data and improved web page notification system for payment failures to be more descriptive and provide rectification steps to customers using Java . Reduced customer tickets regarding payment failures by 72%.	
Carnegie Mellon University	Pittsburgh, PA
Meta AI Sponsored Research Assistant — Advisor: Prof. Louis-Philippe Morency	Feb 2023 – Present
◦ Working with Meta AI on user satisfaction estimation for VR/AR glasses using several modalities like 3D visual data (region around the eyes and eyebrows), language, acoustic, and physiological modalities.	
CMU Capstone — Advisor: Prof. Yonatan Bisk	Jan. 2022 – Dec. 2022
◦ Built state-of-the-art systems for navigation, localization, mapping and interaction of a virtual assistant bot based on user-assigned real-world tasks in collaboration with Amazon Alexa AI . Currently ranked #1 on the Amazon Leaderboard .	
TCS Research and Innovation Labs	Delhi, India
Machine Learning Engineer — Computer Vision Team Advisors: Dr. Lovekesh Vig & Dr. Gautam Shroff	Feb. 2019 – April 2021
◦ Designed a meta-learning based framework for skin lesion and chest x-ray classification , and segmentation of medical and natural scene images. Published 3 papers [2, 3, 4] and built 2 products .	
◦ Explored disentangling biological signals from noise in cellular images using CNNs and ArcFace loss and achieved top-5 percentile in NeurIPS 2019 challenge with test accuracy 96.06%. Worked on distributed training, GANs, visual attention .	
◦ Built an end-to-end alignment and information extraction system for document images using a novel keypoint extraction algorithm . Product sold to the Landmark Group. Published 1 paper [5] and filed 1 US patent [1].	
Intel Corporation	Bangalore, India
Machine Learning Intern Advisor: Mr. Tigi Thomas	Aug. 2017 – Dec. 2017
◦ Created a highly optimized sensor-based gesture detection and recognition model for on-device deployment surpassing benchmarks for memory constraints and output latency. Tested by deploying model on laptop hardware.	
CVML Lab, IIIT Delhi	Delhi, India
Machine Learning Intern Advisor: Prof. Chetan Arora	Aug. 2016 – Dec. 2018
◦ Used texture descriptors (Gabor filters) to improve clothing segmentation (DeepLabV2, FCN) by 3% for visual fashion image and attribute search systems. Exploited pose structure to enhance SoA fine-grained classification performance by 2-3% using CNNs across standard FGVC datasets. Published 2 papers [6, 7].	

PROJECTS

Twitter Cloud Native Web Service with Microservices	Spring 2022
Course Project: Cloud Computing Advisor: Prof. Majd Sakr	
◦ Created an ETL pipeline using Spark for processing 1.2TB Twitter data , and a microservice based architecture using Kubernetes for data retrieval and running analytic jobs in a cost constrained setting.	
Multimodal Image to Recipe Generation	Fall 2022
Course Project: Multimodal ML Advisor: Prof. Louis-Philippe Morency	
◦ Transformer based recipe generation from food images using a novel approach comprising co-learning ingredients, component-aware embeddings , contrastive loss for semantic similarity, and improved evaluation metrics . [Report]	
Natural Language Inference for Code-Switched Hinglish	Spring 2022
Course Project: Multilingual NLP Advisor: Prof. Alan Black	
◦ Improved SoA on GLUECoS benchmark by 6% for code-switched Hindi-English by translating to matrix or embedded language, and adaptation of language models to the code-switched domain using transformer models XLM-R, mBERT, mt5 etc. [Report]	

PATENTS AND PUBLICATIONS

[1] K. Mahajan , M. Sharma, L. Vig, Tata Consultancy Services Limited. “Method and System for Keypoint Extraction from Images of Documents”. Filed at the Indian Patent Office. Number: 201921035983 (PCT filed. Number: WO202104447A2)	
[2] A. Pandit, K. Mahajan , S. Kunde. et. al. “Data-Efficient Training of High-Resolution Images in Medical Domain”. 29th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN) 2021. [PDF]	
[3] K. Mahajan , M. Sharma, L. Vig. et. al. “CovidDiagnosis: Deep Diagnosis of COVID-19 Patients Using Chest X-Rays”. IEEE International Workshop on Thoracic Image Analysis, MICCAI 2020. [PDF]	
[4] K. Mahajan , M. Sharma, L. Vig. “Meta-DermDiagnosis: Few-Shot Skin Disease Identification using Meta-Learning”. IEEE International Conference on Computer Vision and Pattern Recognition 2020 Workshops (CVPRW). [PDF]	
[5] K. Mahajan , M. Sharma, L. Vig. “Character Keypoint-based Homography Estimation in Scanned Documents for Efficient Information Extraction”. CBDAR workshop at the 15th IEEE International Conference on Document Analysis and Recognition (ICDAR) 2019. [PDF]	
[6] K. Mahajan , T. Khurana, A. Chopra, I. Gupta, C. Arora, A. Rai. “Pose Aware Fine-Grained Visual Classification Using Pose Experts”. 25th IEEE International Conference on Image Processing (ICIP) 2018. [PDF]	
[7] T. Khurana, K. Mahajan , C. Arora, A. Rai. “Exploiting Texture Cues for Clothing Parsing in Fashion Images”. 25th IEEE International Conference on Image Processing (ICIP) 2018. [PDF]	

SKILLS & ACHIEVEMENTS

Programming Languages, Frameworks and Tools: Python, C, C++, Java, SQL, Tensorflow, Pytorch, Keras, Spark, PySpark, Caffe, OpenCV, Scikit, NumPy, Pandas, SciPy, EspNet, Kafka, Samza, HBase, MongoDB, AWS, Azure, Kubernetes, Docker
Achievements: Best Capstone Solution Award (MCDS at CMU), Travel Grant: AICTE-INAE for ICIP 2018, Dean’s List: 2017-2018.