

Anirudh Choudhary

RESEARCH INTERESTS	Causal Inference (Robust Clinical Policy Learning) Medical Image Processing Reinforcement Learning	E-mail: achoudhary46@gatech.edu Website: anic46.github.io
EDUCATION	Georgia Institute of Technology , Atlanta, USA <i>Aug'18 - present</i> <i>M.S.(Thesis), Computational Science and Engineering (GPA: 3.87/4.00)</i> Thesis : Robust Causal Inference for Biomedical Data Analysis in Observational Settings Indian Institute of Management Calcutta , Kolkata, India <i>Jun'11 - Apr'13</i> <i>Masters in Business Administration (Top 20%) (GPA: 6.74/9.00)</i> Indian Institute of Technology Kharagpur , Kharagpur, India <i>Jul'05 - May'10</i> <i>B.Tech & M.Tech (Honors), Electrical Engineering (GPA: 7.83/10.00)</i>	
PUBLICATIONS (*EQUAL CONTRIBUTION)	A. Choudhary , H. Wu, L. Tong, M. Wang, "Learning to Evaluate Color Similarity for Histopathology Images using Triplet Networks", ACM Conference on Bioinformatics, Computational Biology, and Health Informatics, 2019 (Long Oral) [Paper] [Slides] M. Krishnan*, A. Choudhary* , C. Chakraborty, A.K. Ray, R. Paul, "Texture based segmentation of epithelial layer from oral histological images", Micron Journal (<i>Elsevier</i>), 2011 [Paper] M. Krishnan, P. Shah, A. Choudhary , C. Chakraborty, R. Paul, A.K. Ray, "Textural characterization of histopathological images for oral sub-mucous fibrosis detection", Tissue Cell Journal (<i>Elsevier</i>), 2011 [Paper] F.P. Ferrarese, N. Moretto, D. Botturi, A. Choudhary , G.A. Zamboni, "A new image processing filter for the automatic extraction of organs' internal structures: Application to liver tumors", ECR 2009 [Poster] A. Choudhary , N. Moretto, F.P. Ferrarese, G.A. Zamboni, "An entropy based multi-thresholding method for semi-automatic segmentation of liver tumors", MICCAI Workshop, 2008 (Oral) [Paper] [Slides]	
PREPRINTS (*EQUAL CONTRIBUTION)	L.Tong, A. Choudhary* , S. M. Patil*, Y. Zhang*, M. Wang, "Deep Learning in Whole-Slide Imaging for Precision Computer-Aided Diagnosis", IEEE Journal of Biomedical & Health Informatics (in submission) [Paper] F. Heemeyer*, A. Choudhary* , J. P. Desai, "Pose-aware C-Arm Calibration and Image Distortion Correction for Guidewire Tracking and Image Reconstruction", International Symposium on Medical Robotics, 2020 (in submission) [Paper]	
RESEARCH EXPERIENCE	Biomedical Informatics Lab , Georgia Tech; <i>Graduate Researcher</i> <i>Spring 2019 - present</i> <ul style="list-style-type: none">Evaluated optimal transport based deep generative models for color transfer in pathology images and leveraged self-supervised learning & triplet network to develop color-perceptual similarity metricDeveloped propensity score modeling framework for distributionally robust offline policy learning in contextual bandit setting; Evaluated bootstrapping and adversarial meta approaches on Warfarin, MIMIC Medical Robotics and Automation Lab , Georgia Tech; <i>Graduate Researcher</i> <i>Fall 2019</i> <ul style="list-style-type: none">Developed camera-based approach for estimating X-Ray arm's orientation by using convolutional Siamese tracking with Superpoint network for keypoint detection and homography estimation. Centre for Spatial Planning , Georgia Tech; <i>Research Assistant</i> <i>Fall 2018 - Spring 2019</i> <ul style="list-style-type: none">Formulated multi-year highway infrastructure optimization framework with network reliability constraintsImplemented parallel Genetic Algorithm using OpenCL framework for large scale MDP optimizationSimulated traffic routing using SUMO package and OpenStreetMap data for multiple pavement scenarios B.Tech & M.Tech Thesis , IIT Kharagpur <i>Fall 2008 - Spring 2010</i> <ul style="list-style-type: none">Cancer detection in oral pathology images using spatial & wavelet based texture features (91% accuracy)Designed novel epithelial layer segmentation method combining Gabor filters & multi-variate watershed Biomedical Image Analysis Lab , University of Pennsylvania; <i>Research Intern</i> <i>Summer 2009</i> <ul style="list-style-type: none">Cerebellum segmentation in MRI images using 3D Gabor features based Demons registration & SVMDeveloped novel skull stripping method using level set registration with MRF based tissue classification Altair Robotics Laboratory , University of Verona, Italy; <i>Research Intern</i> <i>Summer 2008</i>	

	<ul style="list-style-type: none"> Developed an automated liver tumor detection algorithm for abdominal CT scans (75% ROI overlap); Applied spline interpolation, watershed segmentation & cross-entropy minimization based thresholding Work incorporated into Mirosurge robotic platform; Stood 4th in MICCAI's tumor segmentation challenge
COURSES	Computer Vision, Graphical Models, Deep Learning, Machine Learning, ML with Limited Supervision, Artificial Intelligence, Pattern Recognition & Image Understanding, CSE Algorithms, Signals & Networks
PROFESSIONAL EXPERIENCE	<p>Mastercard Advisors, India; <i>Senior Analyst, Advanced Analytics</i> <i>Sep'17 – Jul'18</i></p> <ul style="list-style-type: none"> Developed unsupervised models to predict customer persona & shopping behaviour using card transactions Implemented latent class analysis for lifestyle-based customer segmentation of Dubai based theme park Developed graph network based visualization tool to analyse shopping trips of Singapore based mall Developed shopping missions, campaign uplift models & category performance dashboards for a leading South African grocery retailer (5M customers) <p>Loyalty Partner(AmEx subsidiary), India; <i>Manager, Customer Analytics</i> <i>Jun'16 — Aug'17</i></p> <ul style="list-style-type: none"> Led a team of 3 for spend analytics & customer acquisition modelling for India's leading grocery retailer Designed campaign propensity models using logistic regression/CHAID leading to 10x uplift in response Developed XGBoost based model for gender prediction & designed wallet potential estimation framework Business Excellence Award (2017) and Quarter Performance Award (Q4 2016) <p>EXL Analytics, India; <i>Manager, Decision Analytics</i> <i>Jun'13 - Jun'16</i></p> <ul style="list-style-type: none"> Pricing & supply chain analytics for leading US insurer operating T-Mobile's phone trade-in program Led a team of 10 consultants; Formulated pricing and bidding allocation models for primary/secondary markets achieving 30% incremental profits; Developed generalized linear models for mobile price forecasting Developed ARIMAX based time series models for monthly trade-in volume forecasting (95% MAPE) Worked as Chief of Staff to Head of Insurance Operations Management (2013-15) - Supported CXOs in financial analysis, capacity optimization, merger planning & strategy formulation (\$250M portfolio) <p>Sabre Corporation, India; <i>Associate Software Developer</i> <i>Jul'10 – May'11</i></p> <ul style="list-style-type: none"> Full-stack developer responsible for optimization & enhancement of Travelocity.com's checkout module Resolved 20+ critical airline booking and checkout related software issues (\$8M revenue impact) High performance award (top 5 performers in Q1'11); Best technology award at Sabre Hack Day
ACADEMIC ACHIEVEMENTS	<p>NSF Travel Grant & Graduate Student Travel Award(Georgia Tech) - ACM BCB Conference, 2019</p> <p>Runners-up : Procter & Gamble's marketing strategy case-study competition, IIM Calcutta (2013)</p> <p>Finalist : Modulus, financial markets trading competition at IIM Calcutta's business summit (2012)</p> <p>Masters Research Scholarship and Indian Oil Scholarship at IIT Kharagpur, 2009</p> <p>Research Assistantships during internships at Univ. of Verona (2008) & Univ. of Pennsylvania (2009)</p> <p>Best Outgoing Technology Award, IIT Kharagpur (2010)</p> <p>Winner - National level product design competition at Entrepreneurship Summit, IIT Kharagpur (2010)</p> <p>All India Rank 68 in IIT Prelims Examination & 507 in All India Engineering Entrance Examination</p> <p>State Rank 5 in Regional Mathematical Olympiad (2002)</p> <p>Mamraj Agarwal Scholarship in Std 10th; CBSE Merit Certificate in Mathematics (top 0.01% - Std 12th)</p> <p>Qualified for final round of KVPY & cleared state level of National Talent Search Examination (2001)</p>
PROGRAMMING	C, C++, Python, PySpark, R, MATLAB, SQL, PyTorch, Tensorflow
COURSE PROJECTS	<p>Domain Adaptation for Action Recognition in Videos, <i>ML with Limited Supervision</i> <i>Fall 2019</i></p> <ul style="list-style-type: none"> Developed adversarial domain alignment approach using spatio-temporal CNN for aligning UCF and HMDB datasets. Evaluated attention and optical-flow based feature pooling, two stream action recognition network and graph temporal network for temporal domain adaptation. [Video] [Slides] <p>Evaluating Tree Structure based RNN, <i>ICLR Reproducibility Challenge</i> <i>Spring 2019</i></p> <ul style="list-style-type: none"> Performed analysis of Ordered Neurons based LSTM and AWD LSTM frameworks on toxic comments classification and incorporated ON-LSTM in ULMFiT framework for transfer learning. [Report] <p>Traveling Salesman Problem Solver; <i>CSE Algorithms</i> <i>Fall 2018</i></p> <ul style="list-style-type: none"> Evaluated Branch & Bound, MST Approximation & Local Search based approaches for solving TSPLIB instances and implemented List based Simulated Annealing achieving 0-3% relative error. [Report] [Code]