

Anirudh Choudhary

RESEARCH INTERESTS	Machine Learning; Image Processing Biomedical Data Analysis	E-mail: ac67@illinois.edu Website: anic46.github.io
EDUCATION	University of Illinois at Urbana-Champaign <i>Ph.D. in Electrical and Computer Engineering (3.86/4.0)</i> Georgia Institute of Technology <i>Masters in Computational Science and Engineering (3.81/4.0)</i> <i>Thesis: Robust Counterfactual Learning for Clinical Decision-Making using EHRs</i> Indian Institute of Management Calcutta, India <i>Masters in Business Administration (Completed all levels of CFA and FRM)</i> Indian Institute of Technology Kharagpur, India <i>B.Tech & M.Tech (Honors), Electrical Engineering</i>	2020 - present 2018 - 2020 2011 - 2013 2005 - 2010
PUBLICATIONS	<ol style="list-style-type: none">1. Pose-aware C-arm Calibration & Distortion Correction for Guidewire Tracking & Image Reconstruction <u>F. Heemeyer*, A. Choudhary*, J. P. Desai (*equal contribution)</u> <i>International Symposium on Medical Robotics, 2020 (Oral)</i> [Paper]2. Advancing Medical Imaging Informatics by Deep Learning-Based Domain Adaptation <u>A Choudhary*, L. Tong*, Y. Zhu, M. Wang (*equal contribution)</u> <i>IMIA Yearbook of Medical Informatics, 2020</i> [Article]3. Learning to Evaluate Color Similarity for Histopathology Images using Triplet Networks <u>A. Choudhary, H. Wu, L. Tong, M. Wang</u> <i>ACM Conference on Bioinformatics, Computational Biology, and Health Informatics, 2019 (Long Oral)</i> [Paper]4. Texture based segmentation of epithelial layer from oral histological images <u>M. Krishnan, A. Choudhary, C. Chakraborty, A.K. Ray, R. Paul</u> <i>Micron Journal (Elsevier), 2011</i> [Paper]5. Textural characterization of histopathological images for oral sub-mucous fibrosis detection <u>M. Krishnan, P. Shah, A. Choudhary, C. Chakraborty, R. Paul, A.K. Ray</u> <i>Tissue Cell Journal (Elsevier), 2011</i> [Paper]6. A new image processing filter for the automatic extraction of organ's internal structures <u>F.P. Ferrarese, N. Moretto, D. Botturi, A. Choudhary, G.A. Zamboni</u> <i>European Congress of Radiology, 2009</i> [Poster]7. An entropy based multi-thresholding method for semi-automatic segmentation of liver tumors <u>A. Choudhary, N. Moretto, F.P. Ferrarese, G.A. Zamboni</u> <i>MICCAI Workshop, 2008</i> [Paper]8. Learning disentangled histopathology image representation via latent similarity subspaces <u>A. Choudhary, H. Wu, L.Tong, M. Wang</u> <i>(in preparation)</i>9. Clinical Decision-Making under Uncertainty: A Bootstrapped Counterfactual Inference Approach <u>A. Choudhary, H. Wu, M. Wang</u> <i>(in preparation)</i>	
RESEARCH EXPERIENCE	DEPEND Group , University of Illinois at Urbana-Champaign <i>Mentor: Prof. Ravishankar Iyer</i> <ul style="list-style-type: none">• Modeled long term cognition decline during dementia using ODE-based pathology simulation and policy gradient-based RL; Results competitive with RNN-based supervised learning for prediction upto 6 years.• Survival modeling for chronic liver disease (PBC) using fully parametric RNN-based approach. Leveraged time-based decay function for missing data imputation and self-attention for clinical interpretability. Biomedical Informatics Lab , Georgia Tech <i>Mentor: Prof. May Wang</i> <ul style="list-style-type: none">• Developed self-supervised representation learning approach using triplet networks for image retrieval and perceptual similarity evaluation of histopathology images. Studied optimal transport based deep generative models for color transfer in pathology images. <i>(Publications #3, #8)</i>• Proposed frameworks to tackle model uncertainty and enable improved generalization for RL-based clinical policy learning on health records. Leveraged bootstrapping and adversarial learning to derive robust oral anticoagulant dosing policy. Incorporated meta learning (REPTILE) with IRL-based imitation learning to develop personalized Sepsis treatment policies using MIMIC-III data. <i>(Publication #9)</i>	Fall '20 - Present Spring '19 - Summer '20

Medical Robotics and Automation Lab, Georgia Tech

Fall '19 - Spring'20

Mentor: Prof. Jaydev Desai

- Designed camera-based pose-tracking setup for X-Ray image intensifier using self-supervised point detection (Superpoint) & Siamese object tracking (SiamMask). Combined ridge detection-based segmentation with 3D image reconstruction (FISTA) for tracking guidewire during image-guided surgery. (Publication #1)

Biomedical Image Analysis Lab, University of Pennsylvania; *Research Intern*

Summer '09

Mentor: Prof. Christos Davatzikos

- Developed cerebellum segmentation approach for brain MRI data using 3D Gabor features based Demons Registration & level set techniques (FAST).

Altair Robotics Laboratory, University of Verona, Italy; *Research Intern*

Summer '08

Mentor: Prof. Paolo Fiorini

- Developed liver tumor segmentation algorithm for low-quality CT scans with 75% IOU score (4th in MICCAI's tumor segmentation challenge & incorporated into Mirosurge platform). (Publications #6, #7)

COURSES

Advanced Computer Vision, Deep Learning, Machine Learning, Graphical Models, Random Processes, Computational Inference, Dependable AI, Reinforcement Learning, Linear Algebra, CSE Algorithms

PROFESSIONAL
EXPERIENCE**Mastercard**, India; *Manager, Advanced Analytics*

Sep'17 – Jul'18

- Developed customer segmentation models and performed card spend analysis for leading multinational retailers. Identified customer segments for a grocery retailer and amusement park using hierarchical clustering and latent mixture model. Performed campaign uplift analysis and shopping trip intent analysis using graph networks.

Loyalty Partner (AmEx subsidiary), India; *Manager, Customer Insights*

Jun'16 — Aug'17

- Led a team of 3 to develop predictive marketing models for 50M+ customers of India's leading grocery retailer. Developed models for campaign targeting (logistic regression), behavioural segmentation (CHAID, K-Means), wallet potential estimation (XGBoost) and revenue-growth projection. Awarded "Business Excellence" and "Best Quarterly Performance" awards.

EXL Analytics, India; *Manager, Decision Analytics*

Jun'13 - Jun'16

- Pricing & supply chain analytics for cellphone trade-in program of a Fortune-500 US insurer. Led a team of 10 consultants; Formulated pricing and bid-allocation models for primary & secondary markets achieving 30% incremental profits; Developed logistic regression & Poisson regression models for price forecasting.

Sabre Corporation, India; *Associate Software Developer*

Jul'10 – May'11

- Full-stack developer responsible for optimization & enhancement of Travelocity's flight checkout module. Awarded "High Five" (top 5 performers in Q1'11) & "Best Technology Hack" awards.

ACADEMIC
ACHIEVEMENTS

NSF Travel Grant & Graduate Student Travel Award(Georgia Tech) - ACM BCB Conference, 2019
 Finalist: Modulus, financial markets trading competition at IIM Calcutta's business summit, 2012
 Masters Research Scholarship and Indian Oil Scholarship at IIT Kharagpur, 2009
 Research Assistantships during internships at Univ. of Verona (2008) & Univ. of Pennsylvania (2009)
 Best Outgoing Technology Award, IIT Kharagpur, 2010
 Winner - National level product design competition at Entrepreneurship Summit, IIT Kharagpur, 2010
 All India Rank 68 in IIT Prelims Examination & 507 in All India Engineering Entrance Examination
 State Rank 5 in Regional Mathematical Olympiad, 2002
 Mamraj Agarwal Scholarship in Std 10th; CBSE Merit Certificate in Mathematics in Std 12th
 Qualified for final round of KVPY & cleared state level of National Talent Search Examination, 2001

COURSE
PROJECTS

Analyzing the implicit adversarial robustness of networks trained using SGD [[Report](#)] Fall 2021
 Guidewire detection and 3D reconstruction for image-guided surgery [[Report](#)] Spring 2020
 HIV infection simulation using mean-field ODE and antiretroviral drug-dosing using RL [[Report](#)] Spring 2020
 Domain adaptation using spatio-temporal features for video activity recognition [[Video](#), [Slides](#)] Fall 2019
 Toxic comment classification using ordered neurons-based LSTM [[Report](#)] Spring 2019
 Solving TSP using heuristic and local search algorithms [[Report](#), [Code](#)] Fall 2018

TECHNICAL
SKILLS

Programming C/C++, Python, PyTorch (library)
 Softwares & Tools R, MATLAB, LATEX, Hadoop, Apache Spark, Hive