Sandipan Choudhuri

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Qualifications Summary: Ph.D. candidate with 7+ years of expertise in engineering advanced Machine Learning frameworks, specializing in cross-domain generalization approaches. Authored 16+ research publications in notable Machine Learning/Networks conferences and journals. Hands-on experience in managing cross-functional teams and working closely with stakeholders.

Education

Ph.D. in Computer Science — *Arizona, USA*
Arizona State University • *CGPA:* 4/4 — 2017 - Present

Masters in Computer Science and Engineering — *Kolkata, India*
Jadavpur University • *CGPA:* 8.44/10 — 2013 - 2015

Bachelors in Computer Science and Engineering — *Kolkata, India*
West Bengal University of Technology • *CGPA:* 8.6/10 — 2009 - 2013

Professional Experience

NetXT Lab, Arizona State University — *Arizona, USA*
Research Assistant — Aug 2019 - Present

- Showcased significant advancements in mitigating annotation overhead with 6+ state-of-the-art works on domain adaptation.
- Designed frameworks for determining optimal treatment facility locations and gauging opioid misuse through social media chatter insights, using time series modeling and data analytics in an AHCCCS initiative to combat Arizona's opioid crisis.
- Architected a game-theoretic approach toward modeling human trafficking interdiction as part of an NSF-funded initiative.

Rovicare — *Arizona, USA*
Machine Learning Intern — May 2022 - Aug 2022

- Boosted patient intake performance by a factor of 27 by engineering a cloud-based machine learning framework to extract proprietary data from scanned patient records.
- Spearheaded the overhaul of ticketing and contract systems, slashing processing time by 45%, improving in-house efficiency.
- Coordinated end-to-end execution of specification gathering, model development to testing, and generating metric reports.

Interbiz — *Arizona, USA*
Machine Learning Intern — May 2021 - Aug 2021

- Optimized claims processing by 18x via creating a bespoke document parser for scanned health/auto insurance claim forms.
- Implemented a HIPAA-compliant cloud application, empowering 500+ healthcare providers with secure health record access.
- Orchestrated comprehensive project scope refinement, computational methods optimization, efficacy verification, and managing stakeholder engagement for successful roll-out to operational platforms.

CMATER Lab, Jadavpur University — *Kolkata, India*
Junior Research Fellow — Aug 2015 - Mar 2017

- Led the development of a production-level system for advanced breast cancer diagnostics, encompassing requirements gathering, data sourcing, and model architecture, resulting in a 70% reduction in diagnosis time.
- Published four benchmark works on scene labeling, contour detection, image segmentation, and object localization.

Skills

Languages: Python, Java, C++, C, SQL, NoSQL, JavaScript, HTML + CSS.
Libraries & Frameworks: PyTorch, Keras, Pandas, NumPy, Scikit-learn, OpenCV, Statsmodels, Spark MLlib, Matplotlib, Seaborn, Flask, Apache Spark, Hadoop, Tableau, SpaCy, Gurobi, D3.js, Docker, Matlab, Git.
Focus Areas: Machine Learning, Deep Learning, Data Mining, Statistical Learning, Pattern Recognition, Computer Vision, Time-Series Analysis, Natural Language Processing, Data Visualization.

Additional Projects

Domain Adaptation in Unconstrained Label-Space

- Proposed a domain-generalization framework for unsupervised image classification without prior label set knowledge.
- Bagged highest average accuracies across benchmarks on *Office-31, Office-home, VISDA2017*, and *ImageNet-Caltech* datasets.

Colonoscopic Image Segmentation

- Devised a framework to automatically identify salient colonoscopic frames and polyp areas, reducing constant monitoring.
- Achieved a 6% improvement in *mean Intersection Over Union* over the benchmark *UNet*, on a *Mayo-Clinic* dataset.

Natural Scene Labelling

- Designed a multi-scale scene labeling framework with *VGG* backbone and super-pixel data to capture context information.
- Outperformed state-of-the-art super-pixel-based methods on the *Stanford B.* and *MS-COCO* datasets.

Contour Detection on Natural Scenes

- Architected a game-theoretic approach for multi-scale contour detection, with texture and color-based features as two players.
- Secured the second position across benchmarks (average precision: 0.67, peak recall: 0.91) on the *BSDS-500* dataset.

DNN Visualization Using Knowledge Distillation

- Implemented a visualization framework with a variational autoencoder and a linear network to probe its behavior.
- Examined the platform's efficacy using *ResNet* and *VGG* backbone models on *MNIST*, *Fashion-MNIST*, and *SVHN* datasets.

Activity Recognition using Myo Gesture-Control Armband

- Acquired gesture data (*Inertial Measurement Unit (IMU)* and *Electromyography (EMG)*) from subjects wearing sensor bands, with eating durations logged.
- Utilized deep learning methodologies to discern between eating and non-eating behaviors with a 94.76% accuracy.

Research Publications

- "A Robust Negative Learning Approach to Partial Domain Adaptation Using Source Prototypes."
  S.Choudhuri, S. Adeniye, A.Sen. (Accepted) *IEEE ICMLA*, 2023
- "Robust Class-Conditional Distribution Alignment for Partial Domain Adaptation."
  S.Choudhuri, A.Sen. (Accepted) *IEEE ACSSC*, 2023
- "Methodologies for Selection of Optimal Sites for Renewable Energy Under a Diverse Set of Constraints and Objectives."
  A. Sen, C. Sumnicht, **S. Choudhuri**, S. Adeniye, A. Sen. (Accepted) *IEEE HICSS*, 2023
- "Quantum Communication in 6G Satellite Networks: Entanglement Distribution Across Changing Topologies."
  A. Sen, C. Sumnicht, **S. Choudhuri**, A. Chang, G. Xue. (In Review) *QCIT@IEEE ICC*, 2024
- "Distribution Alignment Using Complement Entropy Objective and Adaptive Consensus-Based Label Refinement For Partial Domain Adaptation." **S.Choudhuri**, S. Adeniye, A.Sen. *AIA Journal*, 2023
- "Coupling Adversarial Learning with Selective Voting Strategy for Distribution Alignment in Partial Domain Adaptation."
  S.Choudhuri, H Venkateswara, A. Sen. *AdvML@KDD, JCCE Journal*, 2022
- "Domain-Invariant Feature Alignment Using Variational Inference For Partial Domain Adaptation."
  S.Choudhuri, S. Adeniye, H Venkateswara, A.Sen. *IEEE ACSSC*, 2022
- "Optimal Cost Network Design for Bounded Delay Data Transfer from PMU to Control Center."
  A. Sen, S. Roy, K. Basu, S. Adeniye, **S. Choudhuri**, A. Pal. *IEEE GLOBECOM*, 2021
- "Structural Dependency Aware Service Chain Mapping for Network Function Virtualization."
  A Sen, **S Choudhuri**, K Basu. *IEEE DRCN*, 2020
- "Partial Domain Adaptation Using Selective Representation Learning For Class-Weight Computation."
  S.Choudhuri*, R. Paul*, A.Sen, B.Li, H Venkateswara. *IEEE ACSSC*, 2020
- "Combining Multilevel Contexts of Superpixel using Convolutional Neural Networks to Perform Natural Scene Labeling."
  A Das, S Ghosh, R Sarkhel, **S Choudhuri**, N Das, M Nasipuri. *Springer RMLDA*, 2019
- "Identification of At-Risk Groups for Opioid Addiction Through Web Data Analysis."
  K Basu, **S Choudhuri**, A Sen, A Majumdar, D Dey. *epiDAMIK@KDD*, 2018
- "User Satisfaction-Driven Bandwidth Allocation for Image Transmission in a Crowded Environment."
  S Choudhuri, K Basu, A Sen. *MMTC Journal*, 2018
- "Object Localization on Natural Scenes: A Survey."
  S Choudhuri, N Das, R Sarkhel, M Nasipuri. *IJPRAI Journal*, 2018
- "A Quality-Concordance Metric Based Contour Detection by Utilizing Composite-Cue Information and Particle Swarm Optimisation." **S Choudhuri**, N Das, M Nasipuri. *Springer FICTA*, 2017
- "A Multi-Cue Information-Based Approach to Contour Detection by Utilizing Superpixel Segmentation."
  S Choudhuri, N Das, S Ghosh, M Nasipuri. *IEEE ICACCI*, 2016

Awards & Services

- Doctoral Fellowship Award for "strong academic work and research progress" • *Arizona State University* 2022, 2023
- Web chair • *INFOCOM Workshop on Network Science for Quantum Communication Networks* 2022, 2023
- Ph.D. Conference Travel Award • *Graduate & Professional Student Association, Arizona State University* 2022, 2023
- Research award reviewer for the *Graduate Grants Program* • *Arizona State University* 2020 - 2023
- Reviewer for *IEEE journals* and *conferences* 2018 - 2023
- Ph.D. Conference Travel Award • *School of Computing & Augmented Intelligence, Arizona State University* 2019, 2022
- Co-authored and secured *NSF* and *AHCCCS* grants for combating human trafficking and opioid crisis 2019, 2021
- Top 0.5% among 0.25M candidates • *Indian Graduate Aptitude Test in Engineering (GATE)* 2013

Graduate Teaching

Arizona State University

- CSE 572 - Data Mining 2019, 2023
- CSE 551 - Foundation of Algorithms 2017 - 2021
- CSE 205 - Object Oriented Programming and Data Structures 2018
- CSE 110 - Introduction to Programming 2017