

# Sandipan Choudhuri

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## EDUCATION

### PHD | COMPUTER SCIENCE

Dissertation: "Domain Adaptation in Unconstrained Label Spaces."  
Arizona State University

USA | Aug 2017 - Summer 2023 [tentative]

CGPA: 4/4

### MASTERS | COMPUTER SCIENCE & ENGINEERING

Thesis: "A Quality-Concordance Measure-Based Approach to Edge Detection."  
Jadavpur University

India | Aug 2013 - Jul 2015

CGPA: 8.44/10

### BACHELORS | COMPUTER SCIENCE & ENGINEERING

West Bengal University of Technology

India | Aug 2009 - Jul 2013

CGPA: 8.60/10

## PROFESSIONAL EXPERIENCE

### ROVICARE | MACHINE LEARNING INTERN

USA | May 2022 – Aug 2022

- Designed and developed a machine-learning pipeline using **Azure Form-Recognizer Service** and field-value extractor routines to streamline layout-agnostic extraction of clinical information from scanned records of semi-structured healthcare documents.
- Developed an efficient module for keyword search in scanned documents using **Azure Cognitive Services**.
- Built **Python RESTful APIs** and deployed them on the **Azure App Services** with **Docker** runtime.
- Automated stages of a deal pipeline in **HubSpot**; designed modules in HubSpot ticketing for monitoring support request response sessions; devised an automated contract filling system through the integration of **PandaDoc** with HubSpot.

### INTERBIZ | MACHINE LEARNING INTERN

USA | May 2021 - Aug 2021

- Developed a multi-modal data processing architecture for detecting vehicular estimate categories and extracting structured information from the scanned estimates using **Google Document AI**, **Google Cloud Vision API**, and entity detection modules.
- Built **Google Cloud Web Application** services with **OAuth 2.0 framework** authentication (conforming to the HIPAA security and privacy requirements) for accessing and processing healthcare documents from **Google Drive** and **Google Cloud Storage**.
- Created a form-parsing engine for health insurance claim forms using **Google Cloud Vision API** and key-value pair extractors.
- Interacted with the stakeholders for requirements gathering, workflow designing, data processing, and documentation.

### NETXT LAB | RESEARCH ASSISTANT

USA | Aug 2019 – Present

- Working on the **State Opioid Response** project, funded by the **Arizona Health Care Cost Containment System (AHCCCS)**.
- Developed a framework for estimating future opioid overdose incidence volumes over a geographic region and strategically determining optimal locations for setting up Medically Assisted Treatment (MAT) facilities under budgetary constraints.
- Built a pipeline for automatic characterization of opioid-related tweets (using **RoBERTa**) and evaluating their effectiveness as a viable indicator of overdose incidence volume change; a framework for detecting illicit online opioid sales is currently underway.

### CMATER LAB | JUNIOR RESEARCH FELLOW

India | Aug 2015 – Mar 2017

- Served as the technical lead for the **Breast Cancer Diagnostic System** development program on **Fine-Needle Aspiration Cytology** images; duties included research and development, communicating with the expert groups at diagnostic units, and the project management team at Jadavpur University for requirements gathering, data acquisition, and configuring access controls.
- Conducted research and developed models for vision tasks: **Object Localization**, **Semantic Contour Detection** and **Image Segmentation** on natural scene (**BSDS500**, **PASCAL-VOC**, **Stanford B.**) and near-Infrared image (**RGB-NIR Scene**) datasets.

## SKILLS

RESEARCH	Domain Adaptation (Closed-Set/Partial/Open-Set/Source-Free) • Contour Detection • Object Localization Semantic Image Segmentation • Unsupervised Learning • Time-Series Analysis
PLATFORM	Google Cloud Platform (GCP) • Microsoft Azure
LANGUAGE	Python • Java • C++ • C • SQL • JavaScript • HTML • CSS
TECHNOLOGY	Docker • Apache Spark • Tableau • Matlab • Git • ClickUp
LIBRARY	Pytorch • Keras • Pandas • Scikit-learn • OpenCV • Apache Spark MLlib • Seaborn • Flask • D3.js

## AWARDS & SERVICES

- Served as the **Web chair** for the *International Workshop on Network Science for Quantum Communication Networks, 2022 (NETSCIQ-COM - INFOCOM)*. Duties involved designing, updating, and stress-testing the conference website, managing submissions, providing tech support, and reviewing workshop live streams.
- Recipient of the **Engineering Graduate Fellowship** for “*strong academic work and research progress.*”
- Recipient of the **Department Travel Grants**.
- Co-wrote proposals** and was awarded **AHCCCS Research Grant** for the *Arizona State Opioid Response Data Project*.
- Teaching and Research Awards reviewer** for the *Graduate and Professional Student Association* at Arizona State University.
- Top 0.5%** of 0.25 million applicants who took the *2013 Graduate Aptitude Test in Engineering (GATE-2013)* in Computer Science (conducted by the Indian Ministry of Human Resource Department).

## PUBLICATIONS

ASILOMAR 2022	Domain-Invariant Feature Alignment Using Variational Inference For Partial Domain Adaptation S.Choudhuri, S. Adeniye, H Venkateswara, A.Sen (accepted)
ADVML@KDD 2022	Coupling Adversarial Learning with Selective Voting Strategy for Distribution Alignment in Partial Domain Adaptation S.Choudhuri, H Venkateswara, A. Sen
GLOBECOM 2021	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
DRCN 2020	Structural Dependency Aware Service Chain Mapping for Network Function Virtualization A Sen, S Choudhuri, K Basu
ASILOMAR 2020	Partial Domain Adaptation Using Selective Representation Learning For Class-Weight Computation S.Choudhuri*, R. Paul*, A.Sen, B.Li, H Venkateswara
RDMLDA 2019	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
EPIDAMIK@KDD 2018	Identification of At-Risk Groups for Opioid Addiction Through Web Data Analysis K Basu, S Choudhuri, A Sen, A Majumdar, D Dey
MMTC 2018	User Satisfaction-Driven Bandwidth Allocation for Image Transmission in a Crowded Environment S Choudhuri, K Basu, A Sen
IJPRAI 2018	Object Localization on Natural Scenes: A Survey S Choudhuri, N Das, R Sarkhel, M Nasipuri
FICTA 2017	A Quality-Concordance Metric Based Contour Detection by Utilizing Composite-Cue Information and Particle Swarm Optimisation S Choudhuri, N Das, M Nasipuri
ICACCI 2016	A Multi-Cue Information Based Approach to Contour Detection by Utilizing Superpixel Segmentation S Choudhuri, N Das, S Ghosh, M Nasipuri

## NOTABLE PROJECTS

### TIME-SERIES ANALYSIS

PYTHON, STATSMODELS, PANDAS, SCIKIT-LEARN, SEABORN

Developed a pipeline for predicting opioid overdose incidence volumes in a future time frame using time-series analysis and forecasting over *Arizona EMS data*, *opioid overdose records* and *demographic* information. Tasks involved time-series decomposition, stationarity testing using *unit-root tests*, transforming the time series to stationary, testing for seasonality, addressing missing values, computing partial autocorrelation and estimating the series forecastability, running *Granger Causality tests* to gauge the effectiveness of the time series in forecasting another, and developing forecasting models using *ARIMA*, *SARIMA*, *SARIMAX*, *VARMA*, and *VARMAX*.

### DEEPPVID++

PYTHON, KERAS, FLASK, D3, JAVASCRIPT, KNOWLEDGE DISTILLATION

The reliability of a deep-learning model is majorly dependent on the interpretability of its internal operations. Citing this, the **DeepVID** framework is improved to train a basic network using a complex deep-neural model such that its behavior is visually interpretable. This is accomplished by utilizing *variational information* to generate neighbors around data instances and training a linear network to replicate the complex network's behavior on the generated samples through *knowledge distillation*.

## DOMAIN ADAPTATION FRAMEWORKS

PYTHON, PYTORCH, KERAS, ADVERSARIAL LEARNING

Developed frameworks for cross-domain image translation, data augmentation and classification tasks under a domain adaptation setup, with *constrained* and *unconstrained* label-space assumptions between the source and target domains (*closed-set*, *partial* and *open-set* scenarios); built adaptation models for scenarios where access to source data is prohibited during the adaptation process (*source-free* scenario).

## OBJECT LOCALIZATION

PYTHON, KERAS, OPENCV, MATLAB, COMPUTER VISION

Formulated an approach for object localization and semantic image segmentation in natural scenes, using image *super-pixelization* and *deep supervised classification*. Context-based information is captured through patches formed by the first and second neighbor super-pixels (atomic units of an image formed by a perceptual grouping of pixels). These are then mapped to the corresponding object labels using deep classifier networks. A consensus-based labeling strategy is subsequently employed by ensembling the output probabilities at different scales through multiple voting routines.

## IMAGE SEGMENTATION

PYTHON, PYTORCH, BIO-MEDICAL IMAGE PROCESSING

Developed a framework for polyp segmentation in optical colonoscopic video sequences by coupling *deep-siamese networks* with a clustering policy using *balanced entropy-based random walks* to identify informative frames and segment out existing polyps (precursors to colon cancer).

## SEMANTIC CONTOUR DETECTION

PYTHON, KERAS, C++, OPENCV, GAME THEORY, COMPUTER VISION

A multi-scale feature-based contour detection approach is presented here from a game-theoretic standpoint. A mixed strategy Nash Equilibrium is searched in a two-player game (*texture* and *color*-based feature extractors acting as players, with strategies involving *extraction at different scales*). The objective centers around finding a weighted balance of these strategies to minimize the false positives (highlighting spurious edges) and false negatives (missing salient contours).

## TEACHING

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Foundation of Algorithms (TA<sup>1</sup>, Spring & Fall 2018-2021) • Data Mining (TA<sup>1</sup>, Fall 2019) • Object-Oriented Programming and Data Structures (TA<sup>1</sup>, Fall 2017, Spring 2018) • Principles of Programming (TA<sup>1</sup>, Fall 2017)

## RELEVANT COURSEWORK

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Artificial Intelligence • Deep Learning • Statistical Machine Learning • Image Processing • Natural Language Processing • Data Visualization • Pattern Recognition • Vision & Language Frontiers • Data Mining • Information Assurance & Security • Soft Computing • Game Theory • Mobile Computing

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<sup>1</sup>TA: Teaching Assistant