

# MUNTABIR HASAN CHOUDHURY

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## Education

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### Old Dominion University, VA, USA

August 2019 – Present

*Ph.D. in Computer Science*

GPA: 3.84/4.0

**Research Interest:** Natural Language Processing (NLP), Computer Vision (CV), Machine Learning (ML), Deep Learning (DL), Digital Libraries, and Scholarly Big Data

### Elizabethtown College, PA, USA

August 2014 – May 2018

*Bachelor of Science in Computer Engineering*

GPA: 3.36/4.0

**Minor:** Information Systems

## Technical Skills

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**Languages & Database:** Python, PHP, C, HTML, CSS, SQL, MySQL, AWS S3

**Technologies & APIs:** Keras, Tensorflow, PyTorch, OpenCV, scikit-learn, NLP toolkit

**Development Tools:** Anaconda, Jupyter Notebook, Google Colab, Visual Studio, SVN, Git, Docker, AWS

**Operating Systems:** Linux, Mac OS X, Windows Server

## Experience

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### Old Dominion University

August 2019 – Present

*Graduate Research Assistant*

Norfolk, VA

- Developing AI-based applications using ML and DL by leveraging NLP and CV.
- Conducting research on Digital Libraries, Computational Reproducibility and Replicability.
- Mentoring students, writing research papers, and presenting research work at top conferences and journals.

### Los Alamos National Laboratory

June 2020 – August 2020

*Research Intern*

Los Alamos, NM

- Conducted research and implemented a framework for offline handwritten mathematical equation recognition.
- Preprocessed images, built ground truth, applied *OpenCV* for segmentation, blurring, and binary thresholding.
- Employed deep neural networks such as **LeNET5-CNN** as a model backbone and achieved **89%** model accuracy.

### Bihrl Applied Research Inc

June 2021 – August 2021

*Machine Learning Intern*

Hampton, VA

- Developed and enhanced algorithms for *Train Detection* used by *Rail-Inspector* – a cloud-based software that processes aerial imagery of railroad tracks using machine learning and deep learning.
- Built ground truth by labeling images of trains, employed deep learning model such as **FCN** for segmentation.
- Trained the model, solved overfitting problems, optimized the result, and achieved **96%** accuracy.

## Projects

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### AutoMeta | Python, Git, NLP toolkit, Tesseract-OCR, scikit-learn [GitHub](#)

August 2019 – January 2021

- A metadata extractor application to extract metadata fields from scanned book-length documents such as electronic theses and dissertations (ETDs) by leveraging NLP techniques. It uses ML-based methods such as **Conditional Random Field (CRF)**, which incorporates text and visual features. The model was trained and evaluated using [AutoMeta-ETD500](#), and achieved F1 score of **83% – 96%**.

### ETDPC | Python, Git, AWS Textract, S3, TensorFlow, PyTorch, scikit-learn [GitHub](#)

March 2021 – August 2023

- A two-stream novel multi-modal classification model with cross-attention that uses vision encoder (**ResNet50v2**) and text encoder (**BERT with Talking-Heads Attention**) to classify ETD pages into 13 categories. The model was trained and evaluated using [ETDPC-ETD500](#), and achieved F1 score of **84% – 96%**.

### MetaEnhance | Python, Git, Tesseract-OCR, RegEx, Hugging Face [GitHub](#)

May 2022 – December 2022

- An application to improve the metadata quality of ETDs by filling out the *missing values*, correcting the *incorrect values* and *misspellings*, and *canonicalizing the surface values* by leveraging the SOTA ML and DL models. The framework was evaluated against [MetaEnhance-ETDQual500](#) and achieved nearly perfect F1-scores in detecting errors and F1-scores ranging from **85% – 100%** for correcting five of seven key metadata fields.

## Publications

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**JCDL 2023:** MetaEnhance: Metadata Quality Improvement for ETDs of University Libraries. | [Link \(Best Paper Award\)](#)

**ICDAR 2023:** A Study on Reproducibility and Replicability of Table Structure Recognition Methods. | [Link](#)

**WWW 2022:** A Study of Computational Reproducibility using URLs Linking to Open Access Datasets and Software. | [Link](#)

**SDU@AAAI 2022:** Segmenting Technical Drawing Figures in US Patents. | [Link](#)

**JCDL 2021:** Automatic Metadata Extraction Incorporating Visual Features from Scanned ETDs. | [Link](#)

**JCDL 2020:** A Heuristic Baseline Method for Metadata Extraction from Scanned ETDs. | [Link \(Best Poster Award\)](#)