

TEAM SPARKS

TEAM ID : IM-ML0063



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BRANCH : BTECH STREAM : CSE YEAR : II

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TEAM MEMBER 3: MADHUR P. VAIDYA

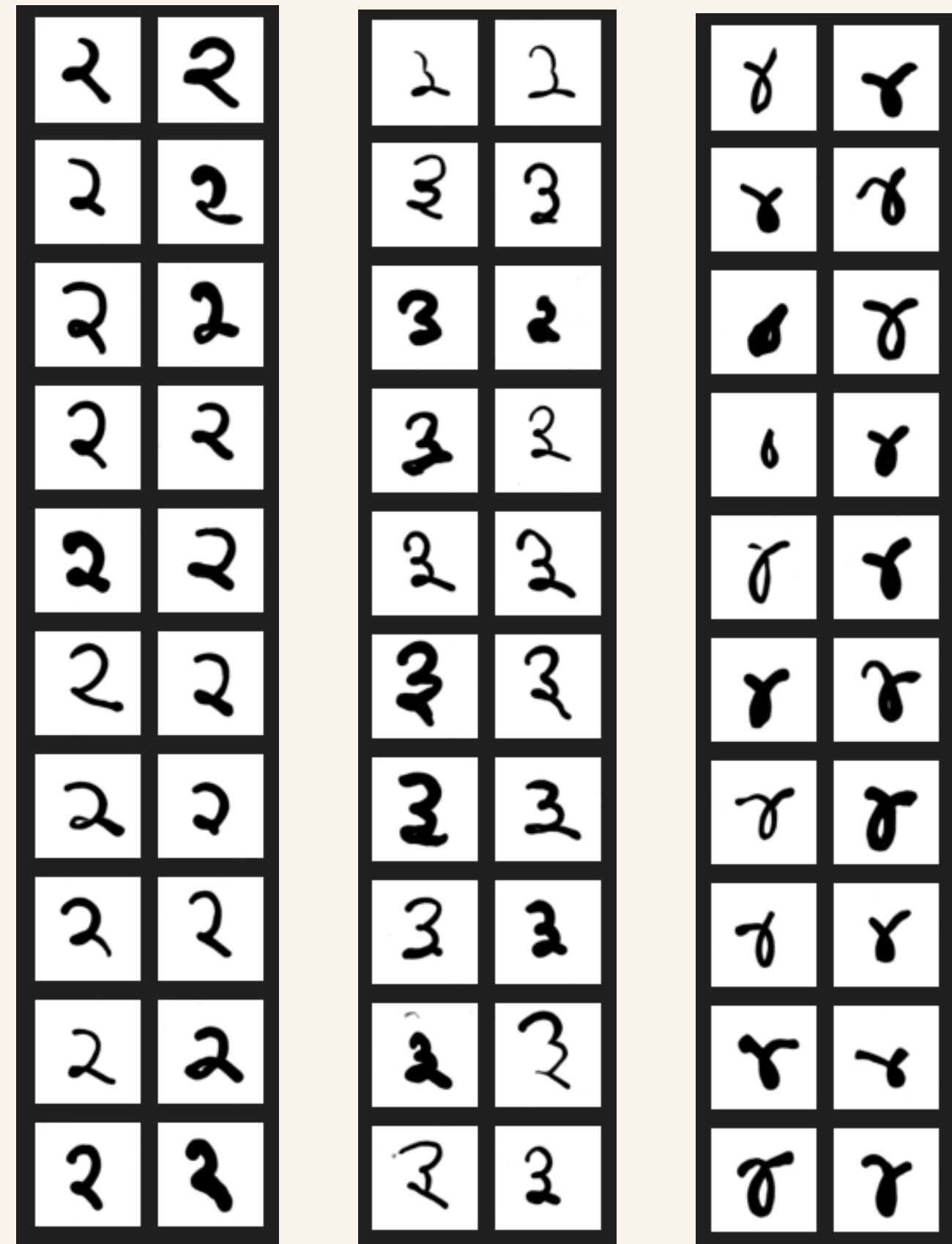
BRANCH : BTECH STREAM : CSE YEAR : II

PROJECT GUIDE : PROF. SHITAL SOBALE

VISHWAKARMA INSTITUTE OF TECHNOLOGY, PUNE

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INTRODUCTION

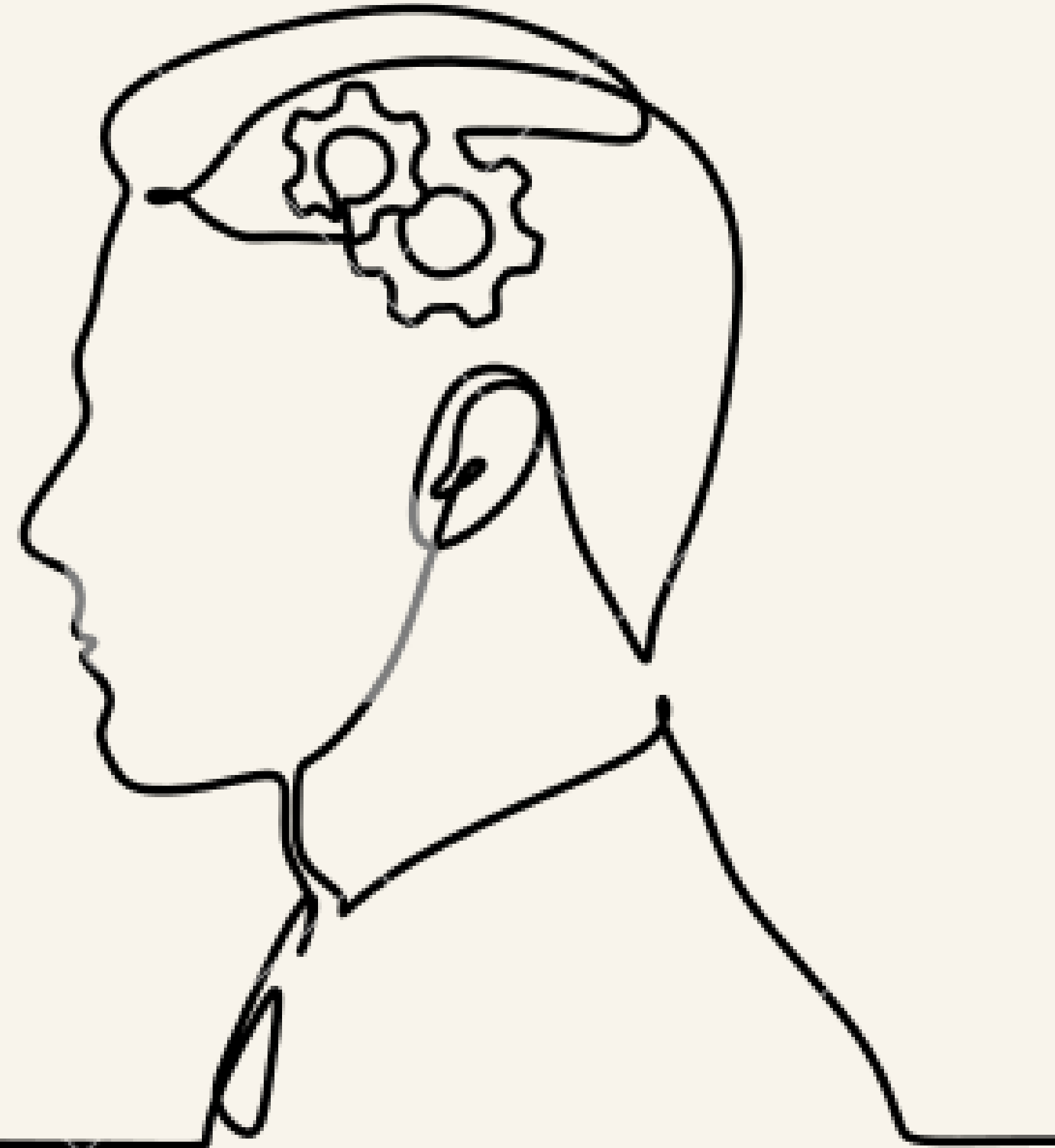
- Postcards scanning
- US Postal Dept saves \$90M every year using automatic systems
- Postcard Scanning project
- Marathi language?
- No good Marathi Dataset

MOTIVATION

- 50.88% Indians - Devanagari based Mother Tongue.
- 617 million speakers of Devanagari based languages
- Very less research about Marathi / Devanagari
- Root problem - no standardized high-quality Dataset
- Many applications possible

PROBLEM STATEMENT

Creating a high-quality dataset for
Devanagari numbers



CREATING DATASETS

- Started creating dataset
- Very lengthy process
- Not practical, especially in short time
- Research - GAN Generative Networks
- Used for creating Datasets

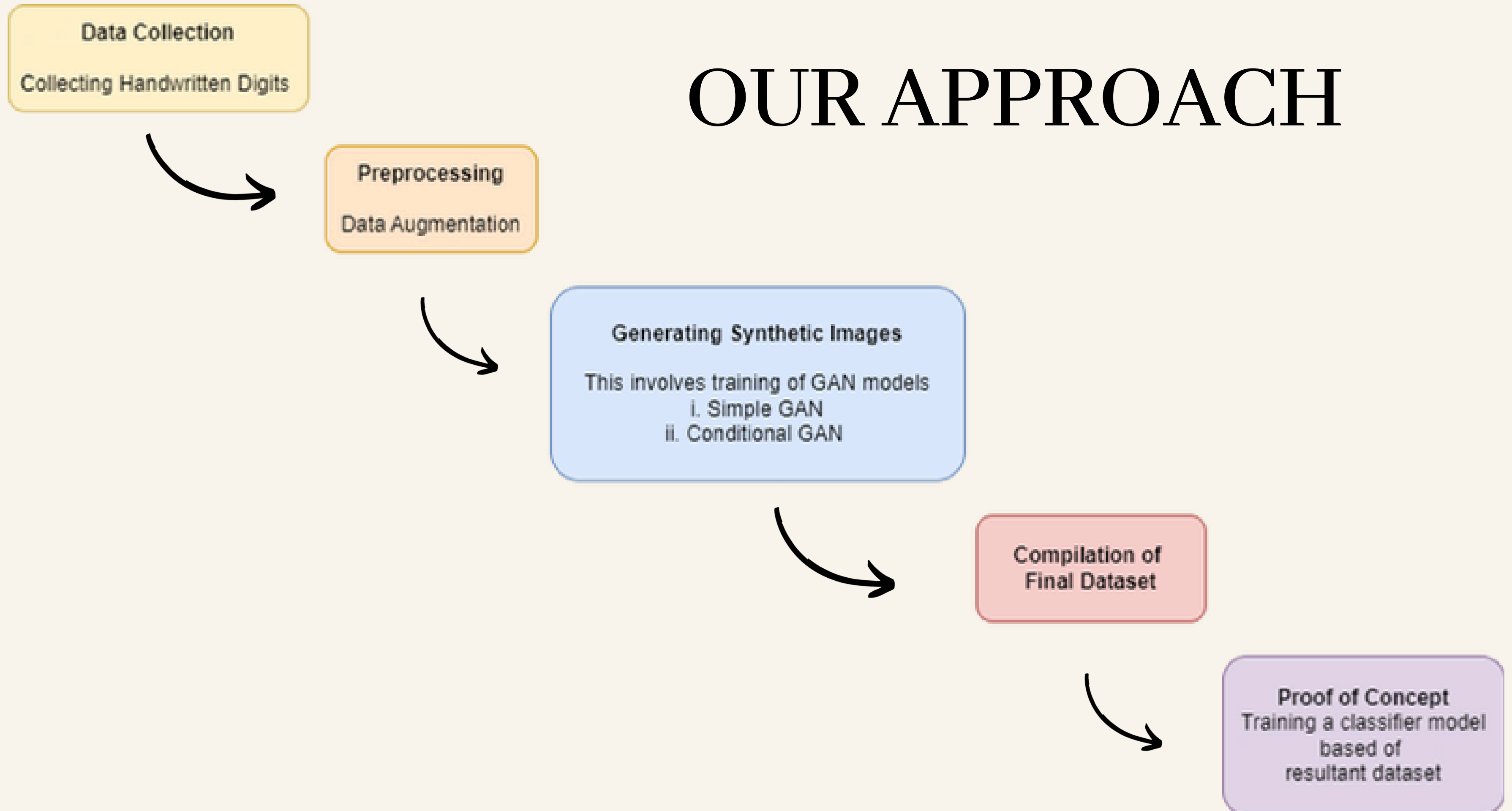
LITERATURE REVIEW

Title	Authors	Key Takeaways
Synthetic Data Augmentation Using GAN For Improved Automated Visual Inspection	Jože M. Rožanec, Patrik Zajec, Spyros Theodoropoulos, Erik Koehorst, Blaž Fortuna, Dunja Mladenić	Used GANs for data augmentation to enhance the classifiers' discriminative performance
Multi-scale multi-class conditional generative adversarial network for handwritten character generation	Jin Liu, Chenkai Gu, Jin Wang, Geumran Youn & Jeong-Uk Kim	Used MSMC-CGAN for Chinese handwriting generation with mean opinion score (MOS) as evaluation method

GEAD: generating and evaluating handwritten Eastern Arabic digits using generative adversarial networks	Tarik Alafif, Rawan Alharbi, Nujood Almajnooni, Maani Albishry	Used four different types of GANs for native Arabic handwritten digit generation and Fréchet Inception Distance (FID) for performance measurement
DeLiGAN : Generative Adversarial Networks for Diverse and Limited Data	Swaminathan Gurumurthy, Ravi Kiran Sarvadevabhatla, R. Venkatesh Babu	Proposed a novel DeLiGAN model for data generation with limited amounts of data.
Augmenting Historical Alphabet Datasets Using Generative Adversarial Networks	David Franc, Adéla Hamplová & Ondřej Svojše	Used GAN for augmenting a small dataset of Palmyrene letters claiming that the results improved by 120%

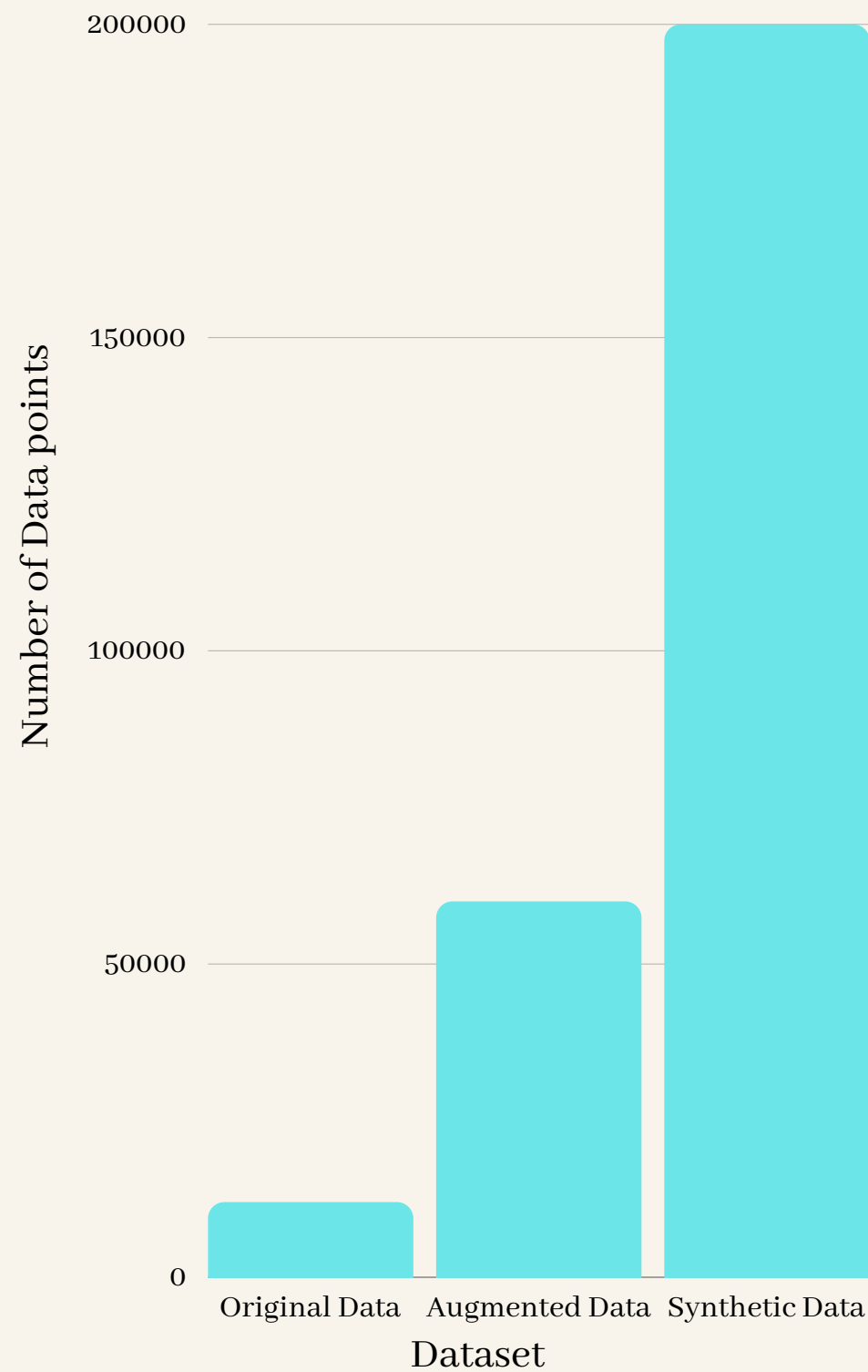
Data augmentation for handwritten digit recognition using generative adversarial networks	Ganesh Jha & Hubert Cecotti	Concluded that GAN based generated images for digits in Bangla, Devanagari, Latin and Oriya improved the accuracy of classifier <u>Results</u>
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OUR APPROACH



SUMMING UP THE SOLUTION

Dataset Size



Accuracy of CNN Classifiers



96

People contributed to the Dataset

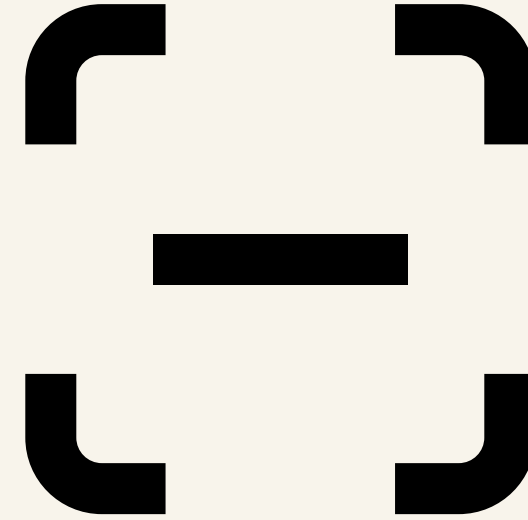
INNOVATIVE FEATURES

- Software based Optimal Pipeline
- High Resolution 128 x 128
- Enormous size 2,00,000 individual digits
- Open Source dataset
- Saved GAN models for future synthetic data generation
- Huge Potential in a spectrum of fields

APPLICATIONS



Historical Archives



OCR

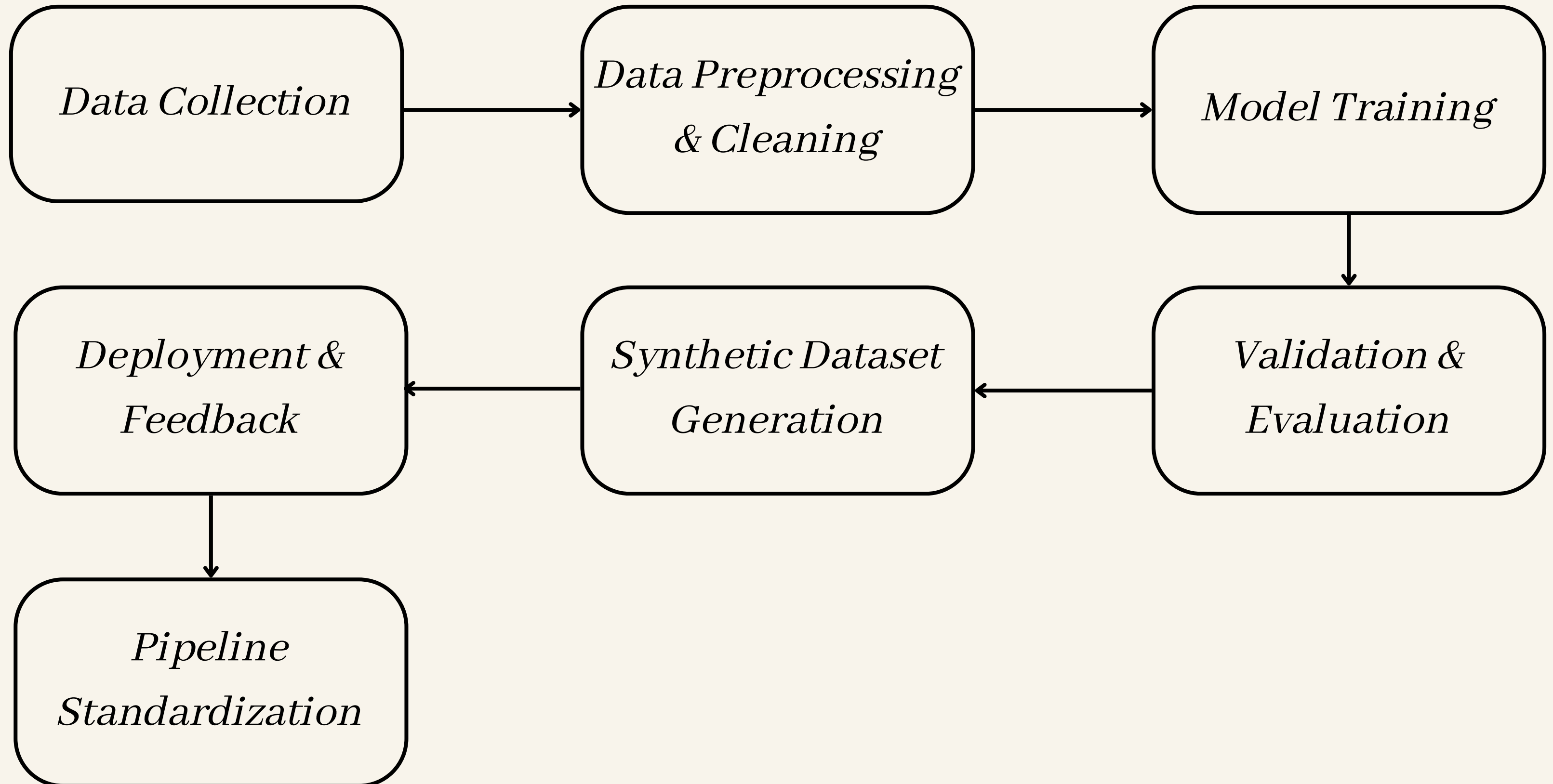


Banking Operations



Handwritten Bills

ROADMAP



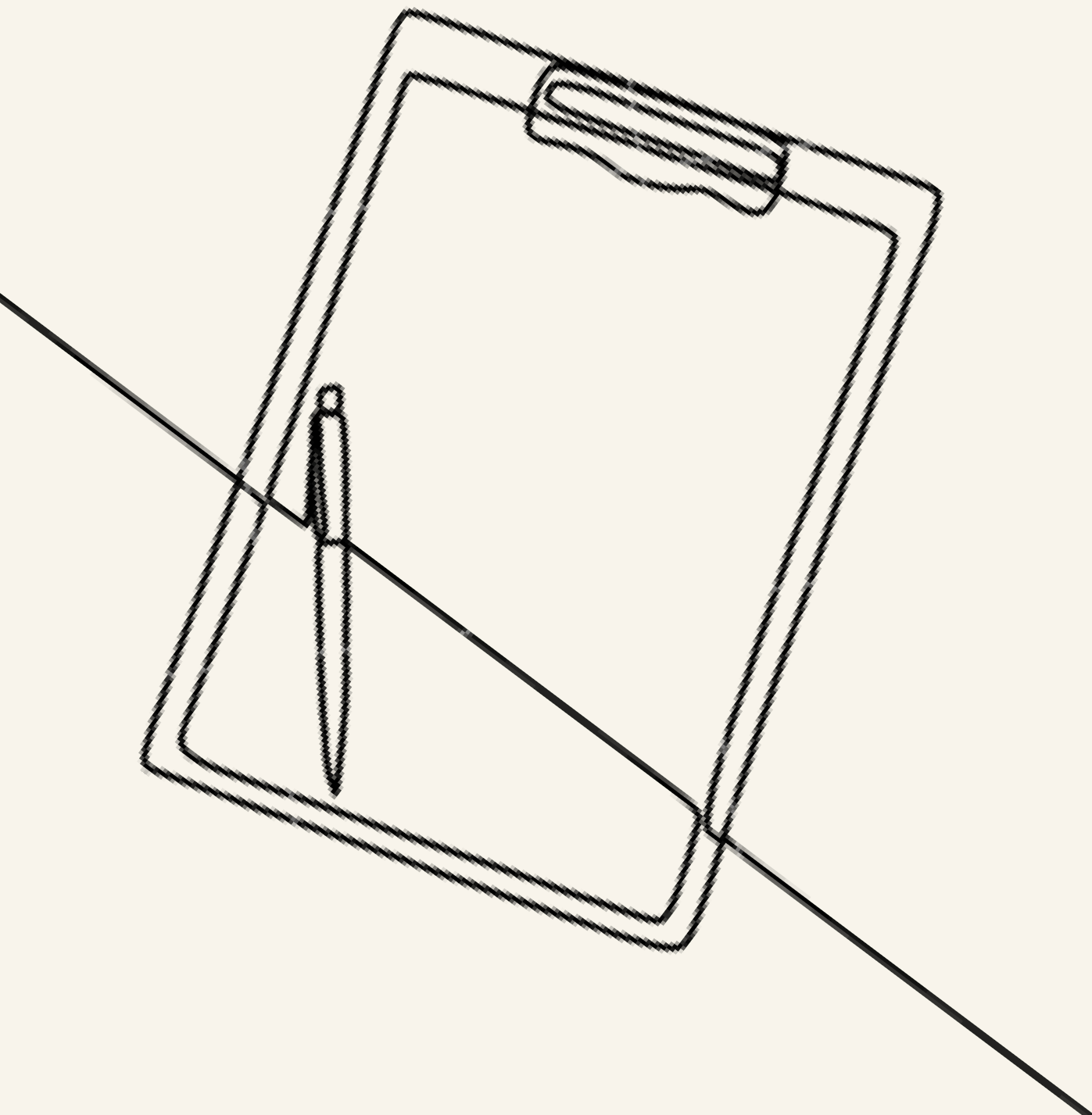
CONTRIBUTING AREAS

- GAN for all Devanagari characters
- GAN for Devanagari words



FAQ

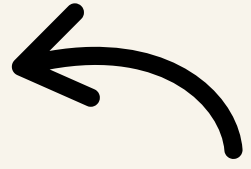
- How much data do you think the GAN is capable of generating?
- What other options did you have, and why did you choose GAN?
- Why open source?
- Does GAN generate new unseen images or only copies of the original dataset?
- How do you know if a model is trained enough to generate good quality images?



THANK YOU

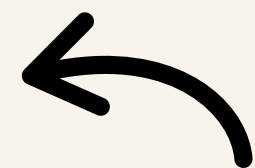


EXTRA SLIDES

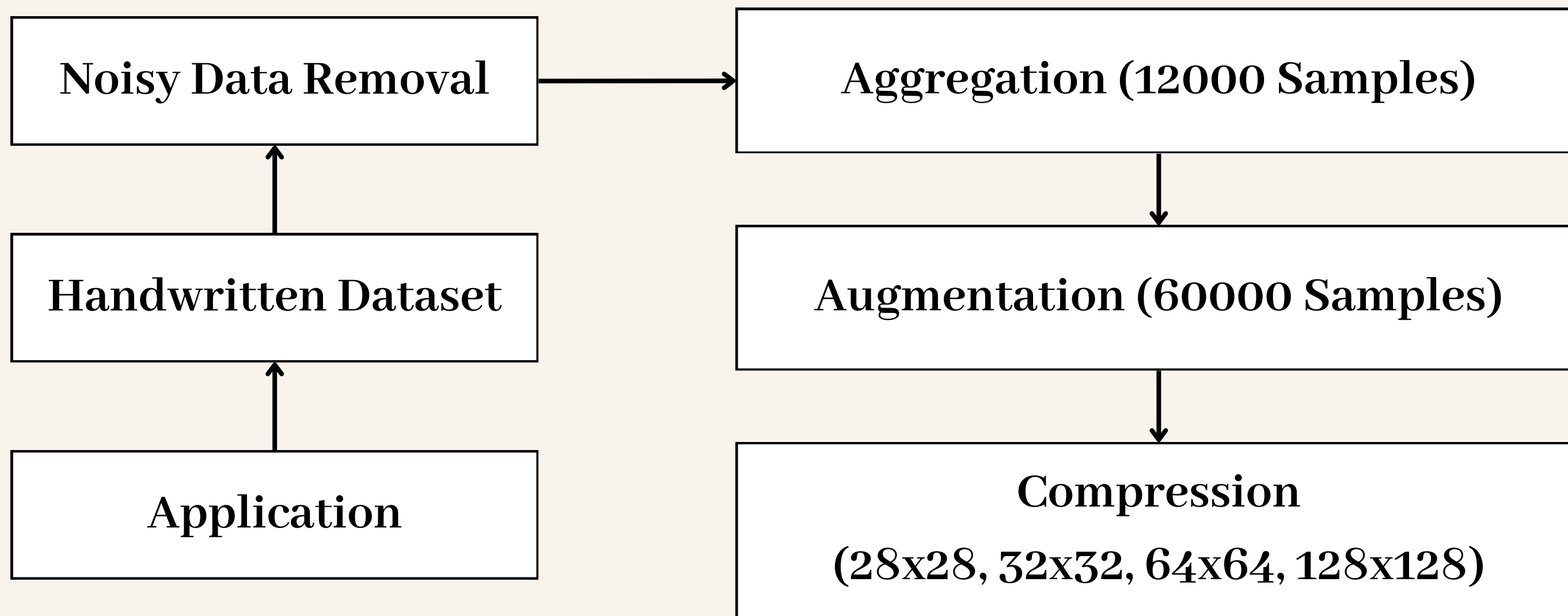


HUMAN GENERATED DATASET COLLECTION

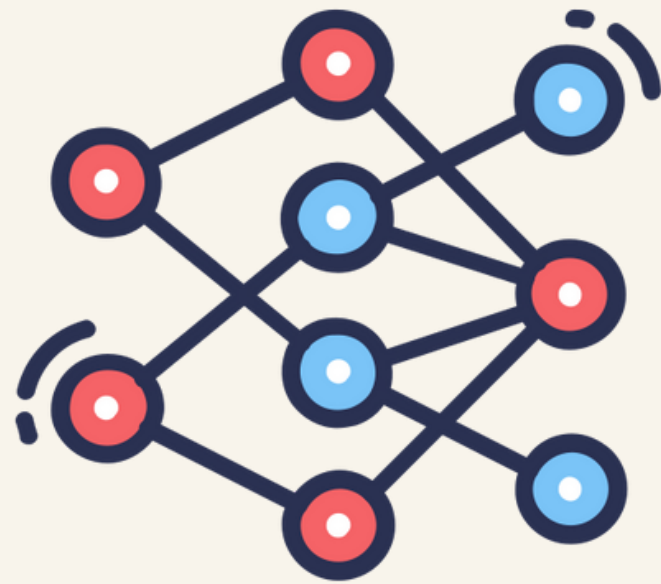
- Novel software-based approach
- 128x128 sized images
- 1200 images per class
- 96 people contributed



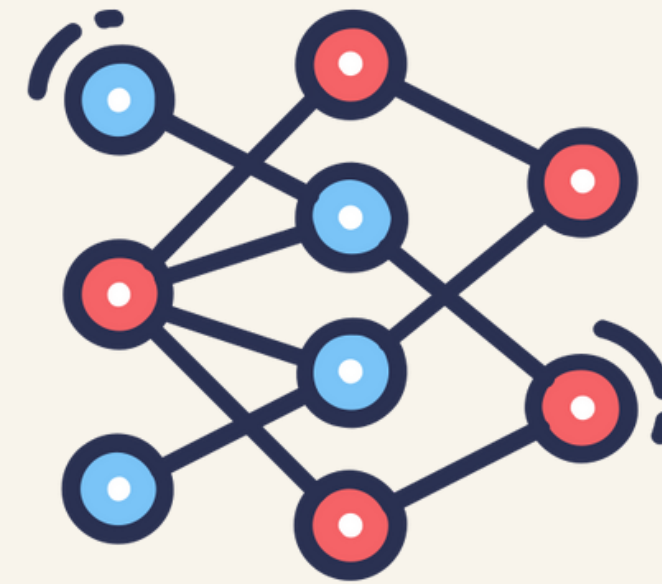
DATA PREPROCESSING



GAN - GENERATIVE ADVERSIAL NETWORKS

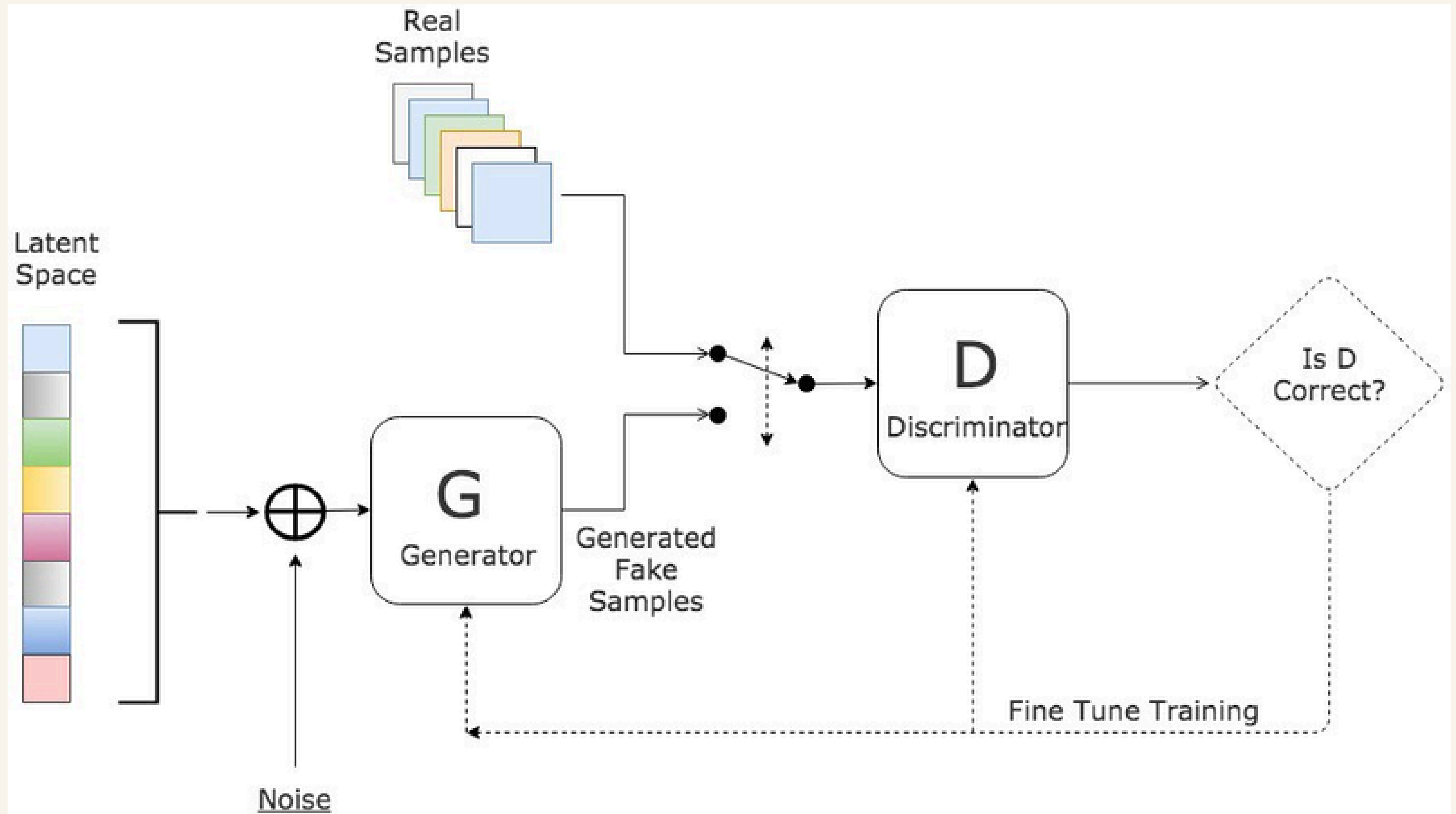


Generator

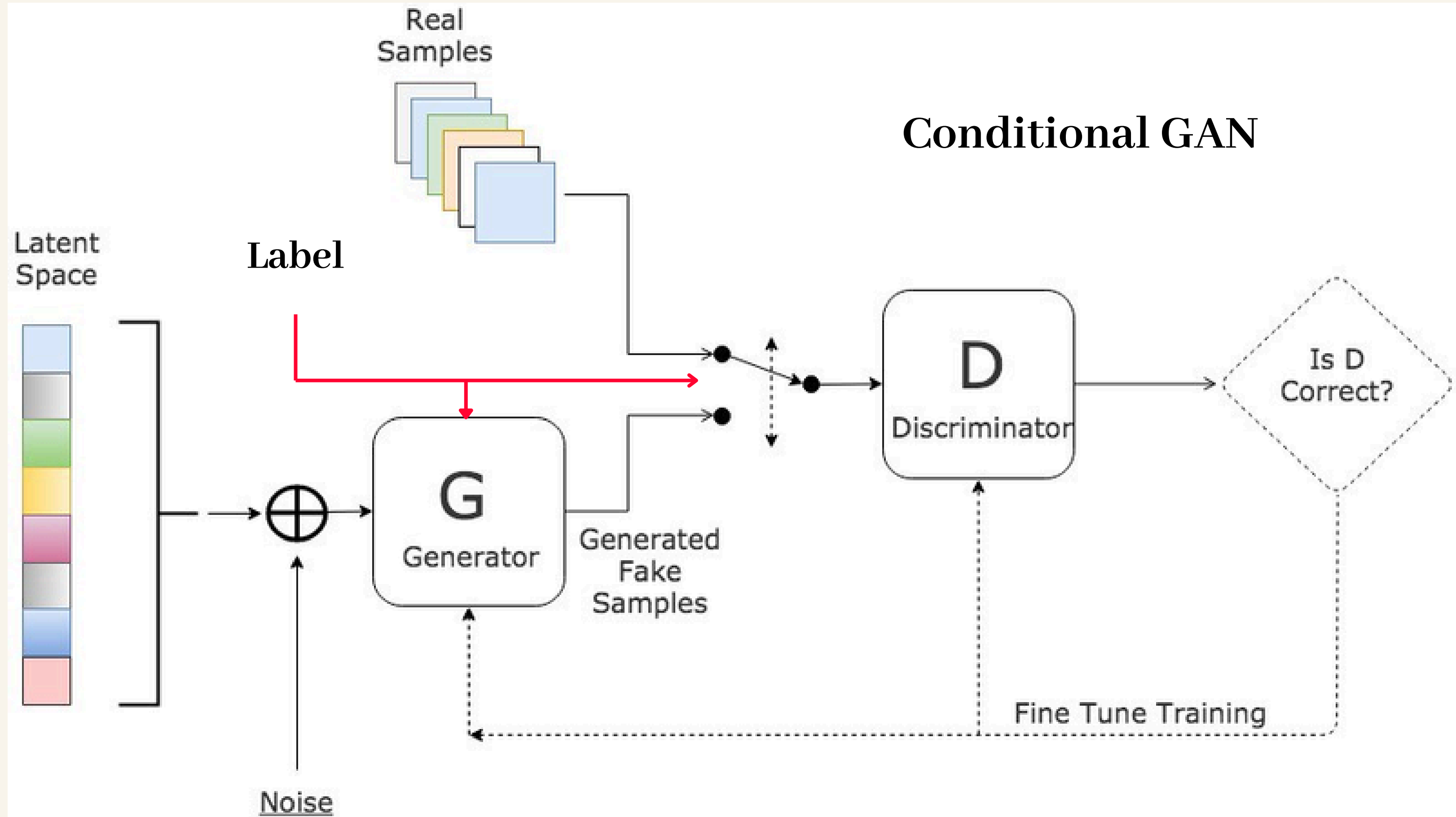


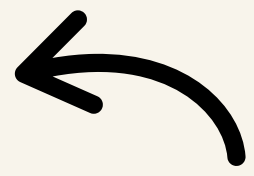
Discriminator

The generator and discriminator are trained **adversarially** to generate **realistic data**

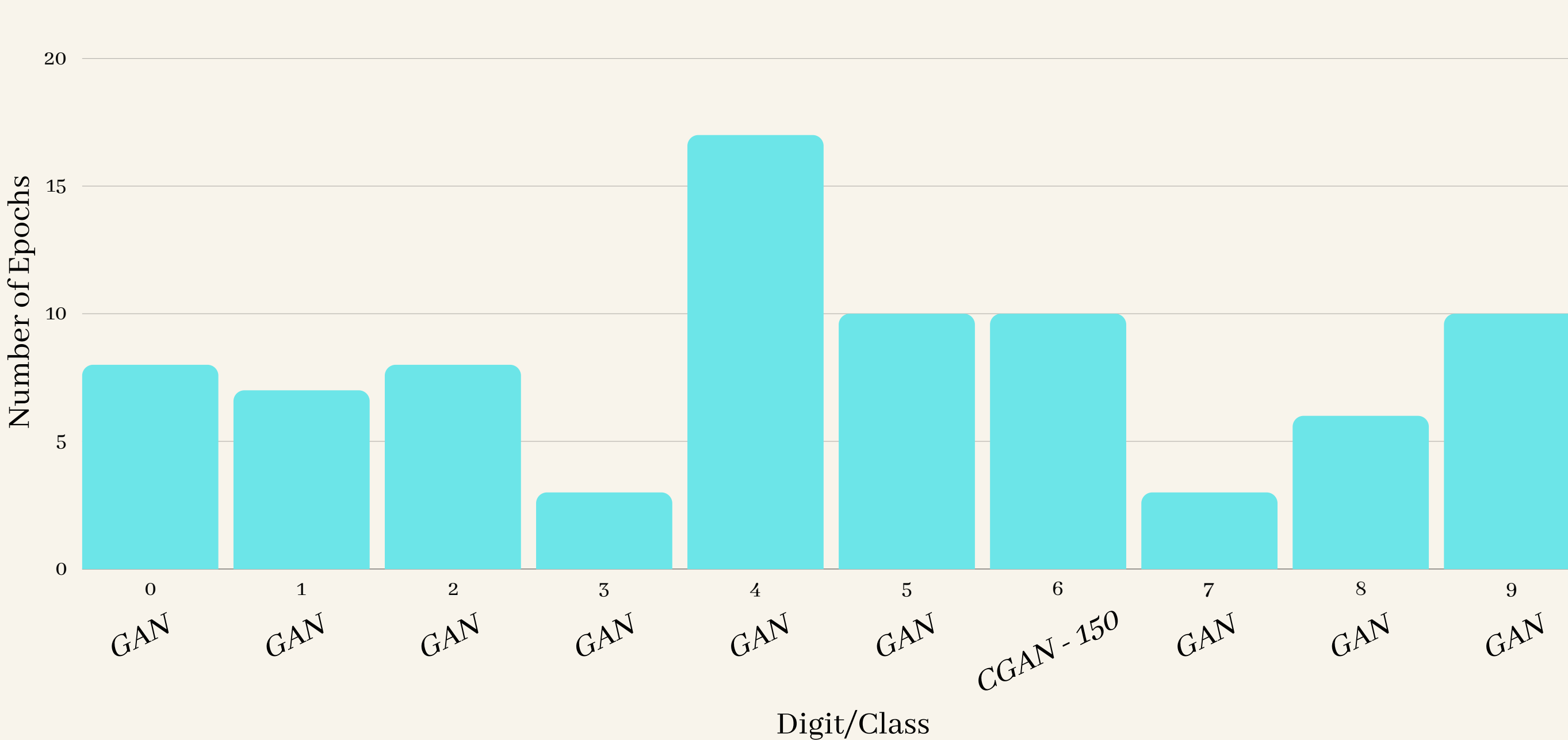


Conditional GAN



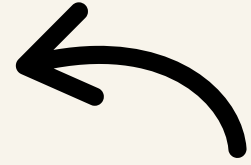


SYNTHETIC DATA GENERATION



20,000 images of each digit from 0 to 9.

2,00,000 images in the dataset with 128 * 128 resolution images

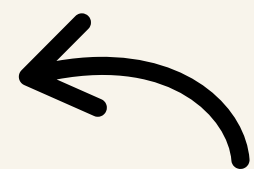


PROOF OF CONCEPT

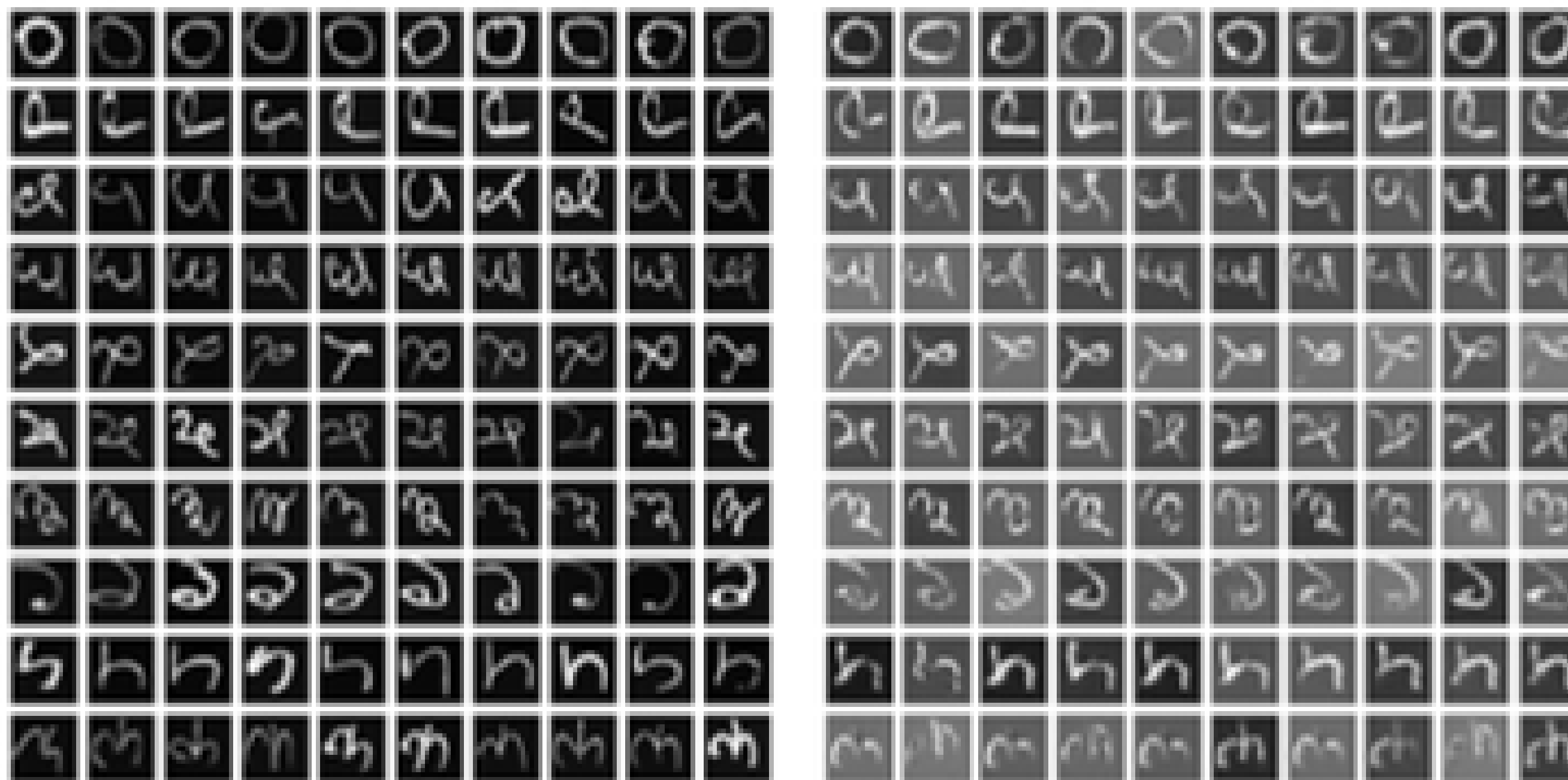
GAN based classifiers can be used in these areas:

- Digit Recognition
- Post Card PIN detection
- Photo

Data DUMP



RESULTS OF PAPER [6]



(b) Images