Automated Personal Writing Pattern Replicator

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Presentation Outline

- Introduction
- Motivation
- Objective
- Scope of Project
- Project Applications
- Methodology
- Expected Results
- Project Timeline
- Project Budget
- References

Introduction

- This project focuses on accurately cloning individual handwriting styles using advanced machine learning, enabling the generation of personalized handwritten text and digital fonts.

- It aims to preserve unique handwriting characteristics, to enhance digital personalization and accessibility for various applications, including custom fonts and educational materials.

Motivation

- Preserve unique handwriting styles affected by physical limitations
- Applications in customized fonts and educational materials.
- Aims to address limitations of traditional handwriting cloning methods by ensuring style consistency and handling arbitrary text lengths.

Objective

- Develop a machine learning system to model and replicate handwriting styles

- Generate consistent, high-fidelity handwritten font for various applications.

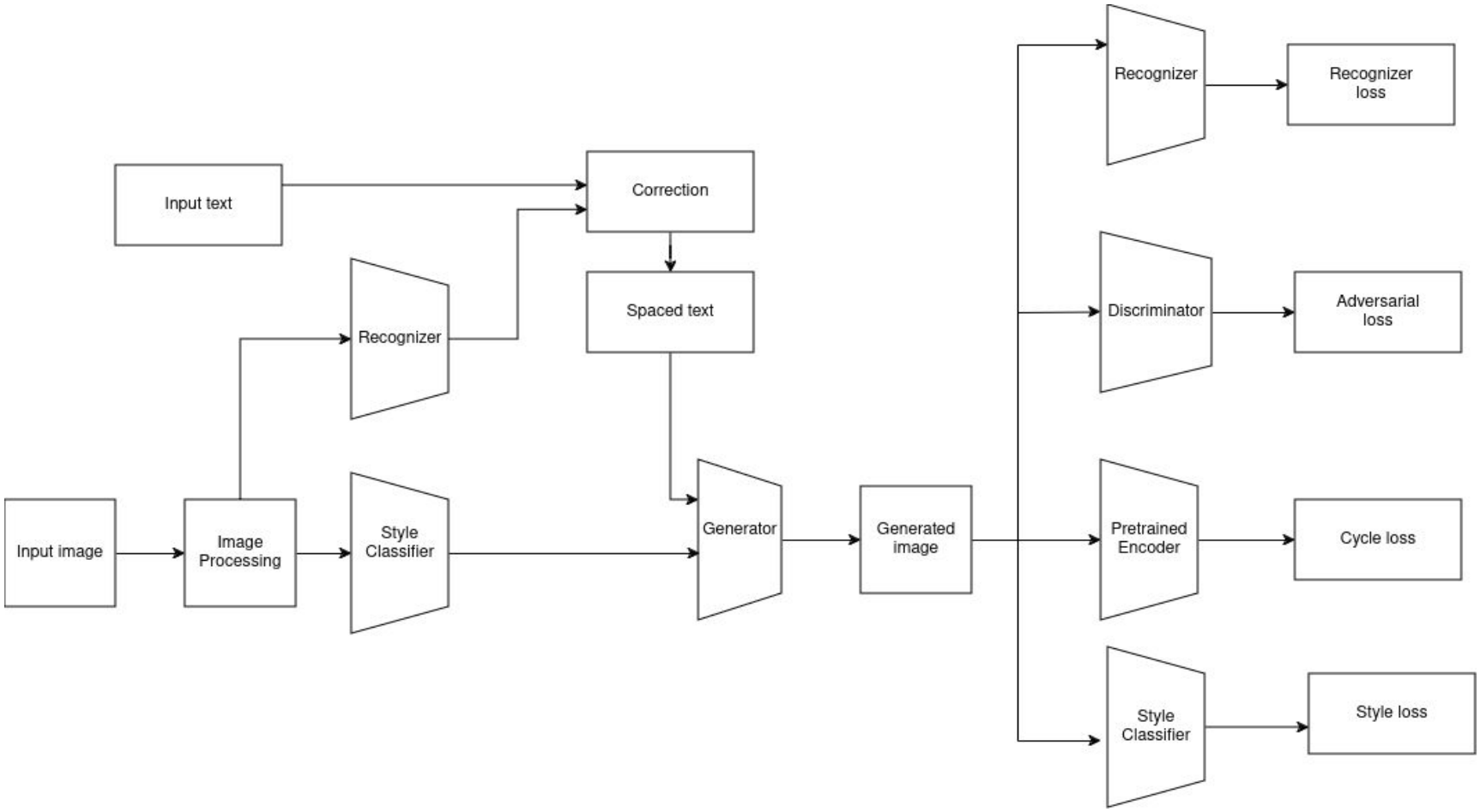
Scope

- Personalized digital communication
- Educational material creation
- Historical document preservation
- Branding and Marketing

Project Application

- E-commerce Personalization
- Used in Calligraphy
- Custom Handwritten Digital Interfaces
- Personal Blogging and Digital Journals

Methodology (Proposed Architecture)



Methodology (Dataset)

- IAM Handwriting Database is available online which has been used for writer identification and verification systems.
- Consists of about 1539 pages of scanned text written by around 657 writers.
- Includes labeled sentences , isolated and labeled text lines.

Methodology (Dataset)

- CVL-Database is also available public database which consists of offline handwritten text documents.
- Consists of around 5000 pages of handwritten text given by 350 writers.
- Consists of cursive style handwriting as well.

Methodology (Dataset)

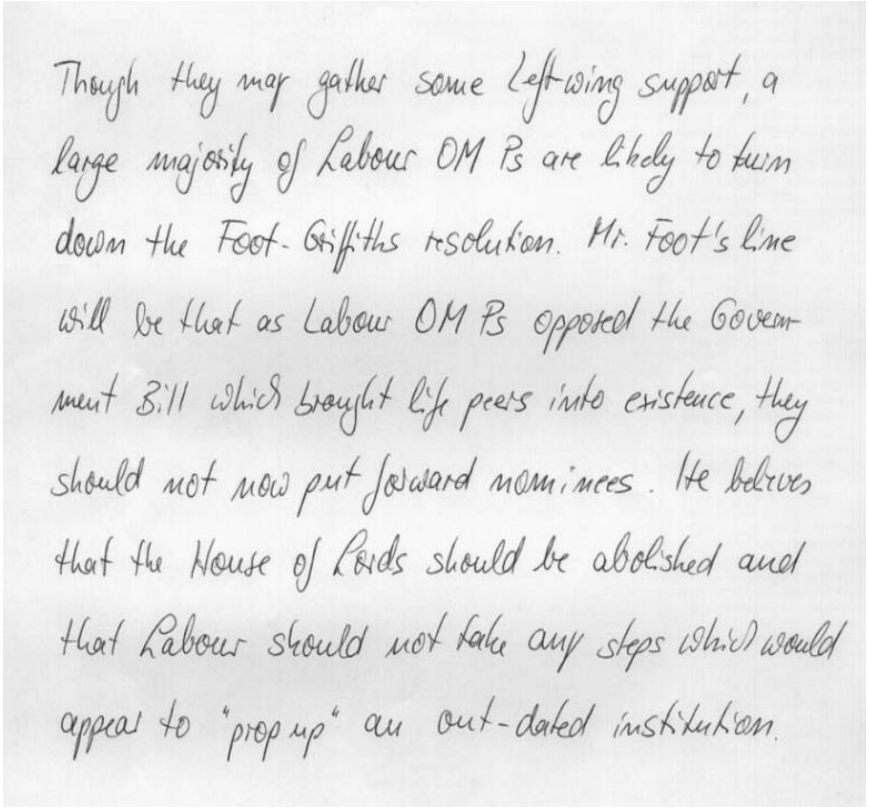


Fig: IAM Dataset Sample

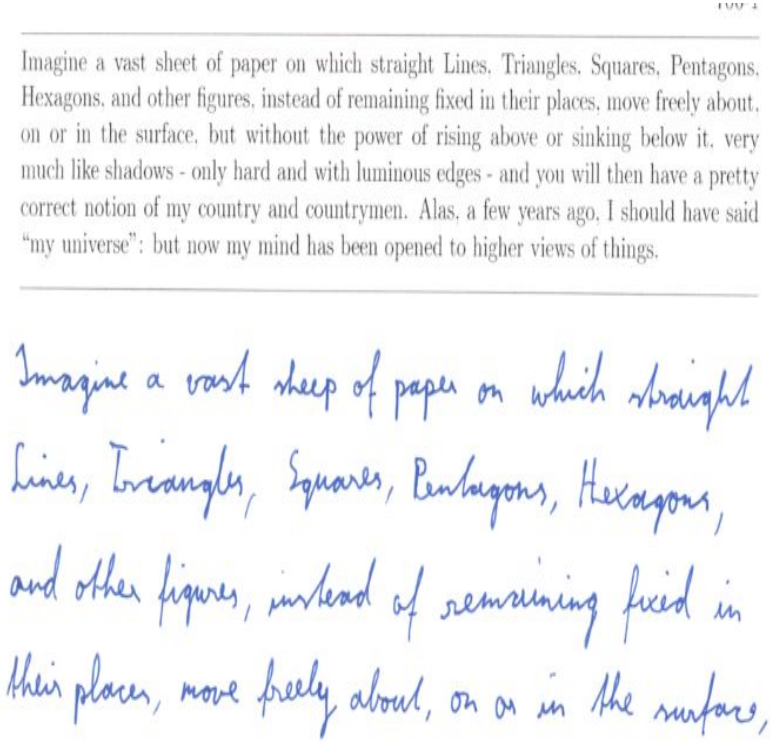


Fig: CVL Dataset Sample

Methodology (Data Processing)

- Dataset present in IAM , CVL database consists of handwritten pages but for our model training we need to crop out the lines.
- For that we will extract the lines by defining the bounding box.
- Converting the images to grayscale to simplify processing and reduce computational load.
- Resize images to a consistent size to ensure uniformity in the training data.

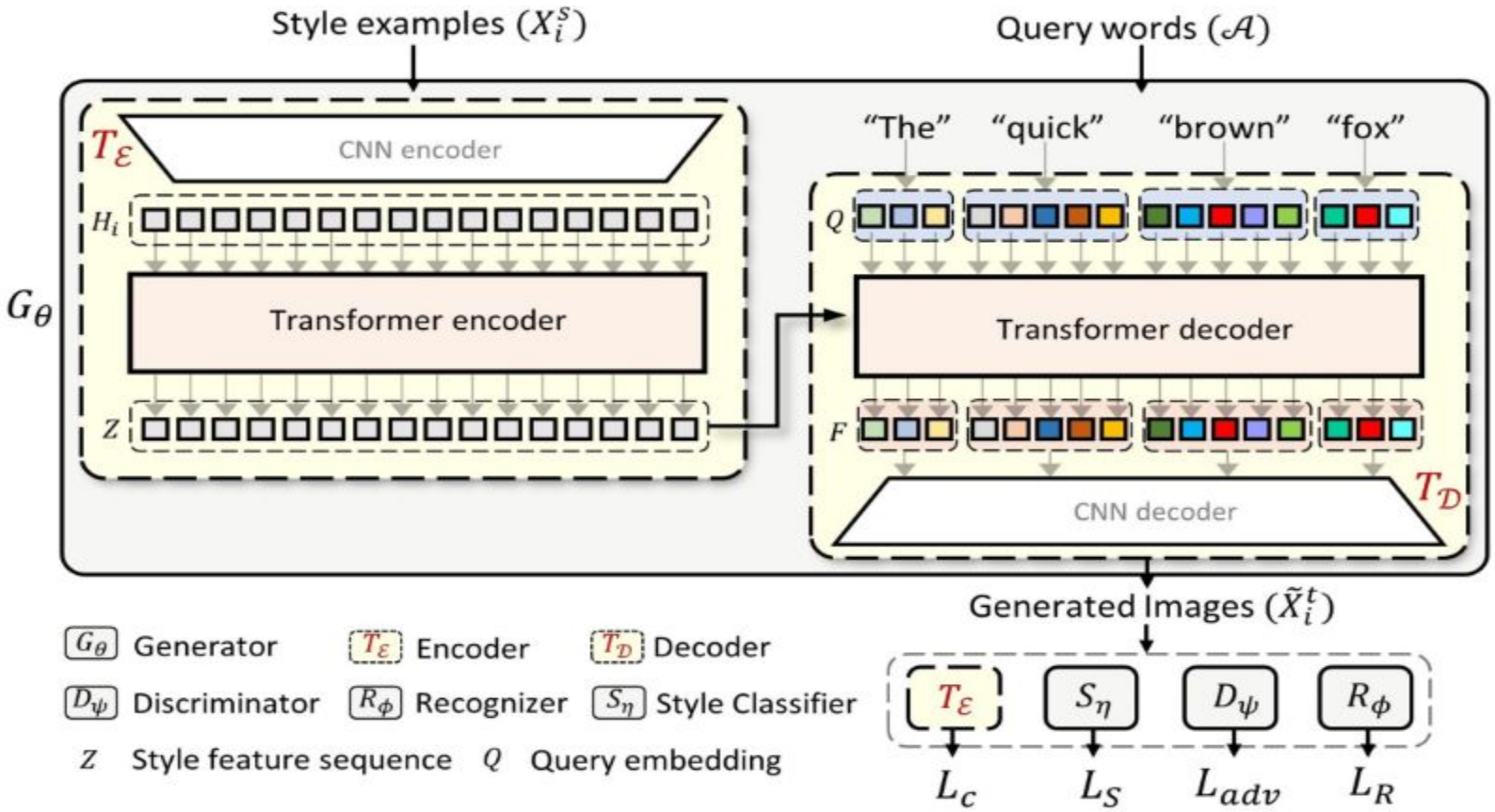
Methodology (Cont.)
(Data Processing)

- For passing the image to train our model, we will use a CNN-based network to obtain the convolutional features from the images.

- The obtained features are flattened and passed to the transformer-based encoder layer.

- Various data augmentation techniques like:- scaling, shearing , noise addition, etc. can be applied to increase the diversity of the datasets.

Methodology (Proposed Model Architecture)- Generator



Methodology (Proposed Model Architecture)- Generator

Style Encoding:

- **CNN Encoder**: Extracts stylistic features from input handwriting examples, converting images into feature representations.

- **Transformer Encoder**: Processes the style feature sequence to capture handwriting nuances, derived from the CNN Encoder features.

Methodology (Proposed Model Architecture)- Generator

Content Encoding:

- **Query Embedding**: Transforms the words from the query into embeddings, representing the content that needs to be handwritten.

Decoding:

- **Transformer Decoder**: Merges the style features and the content embeddings to create a unified feature representation to ensures that the generated handwriting maintains the desired style and accurately reflects the content of the query words.
- **CNN Decoder**: Converts the combined feature representation into the final image of the handwritten text.

Methodology (Proposed Model Architecture)

Recognizer:

- Ensures the generated handwriting is legible and correctly represents the input text by recognizing and validating the characters.

Discriminator:

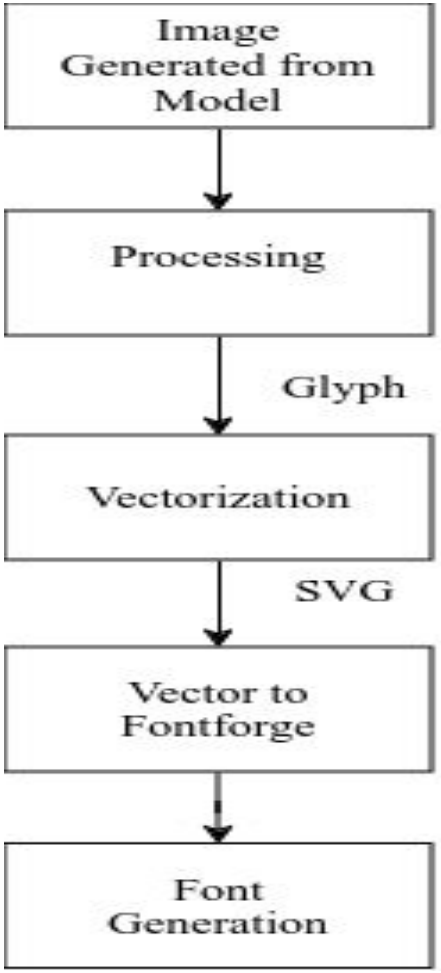
- Differentiates between real and generated handwriting samples to improve the generator’s output through adversarial training.

Methodology (Proposed Model Architecture)

Style Classifier:

- Classifies and extracts individual handwriting styles, ensuring the generated handwriting matches the original style attributes of the writer.

Methodology
(Generated Image to Font file)



Methodology (Generated Image to Font file)

Image Generated from Model:

- Image of handwritten text generated by the handwriting cloning model.

Processing:

- Images undergo some processing to prepare them for vectorization.

Glyph:

- Processed images are converted into individual glyphs.

Methodology (Generated Image to Font file)

Vectorization:

- The glyph images are then vectorized.
- It involves tracing the outlines of the characters to create scalable vector graphics (SVG).

SVG:

- The vectorized glyphs are stored in SVG (Scalable Vector Graphics) format.

Methodology
(Generated Image to Font file)

Vector to FontForge:

- SVG files are imported into FontForge using its Python API.

Font Generation:

- FontForge is used to generate the font file font format such as TrueType (.ttf) or OpenType (.otf).

Methodology (Evaluation)

FID(Fréchet Inception Distance)

- It is a metric used to measure the similarity between two sets of images

Geometric Score

- It gives how closely the generated handwriting matches the topological properties of the original handwriting

Human Evaluation

- Finally, We perform our model performance using human experience.

EXPECTED OUTPUT

Input Text:

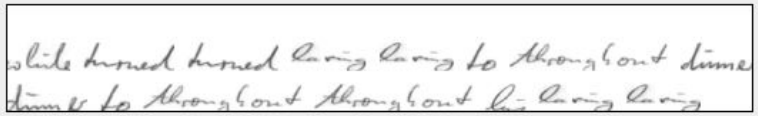
The initial part of the route to the highway remains the same, but the later part of the route from your new workplace to the highway entrance is different.

Drop file or Upload your Image

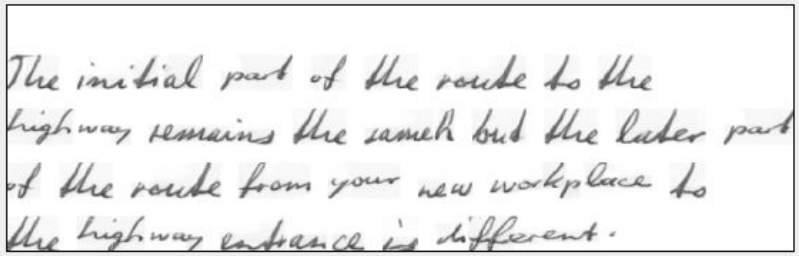
Drop File Here
- or -
Click to Upload

Cancel Submit

Sample Image:



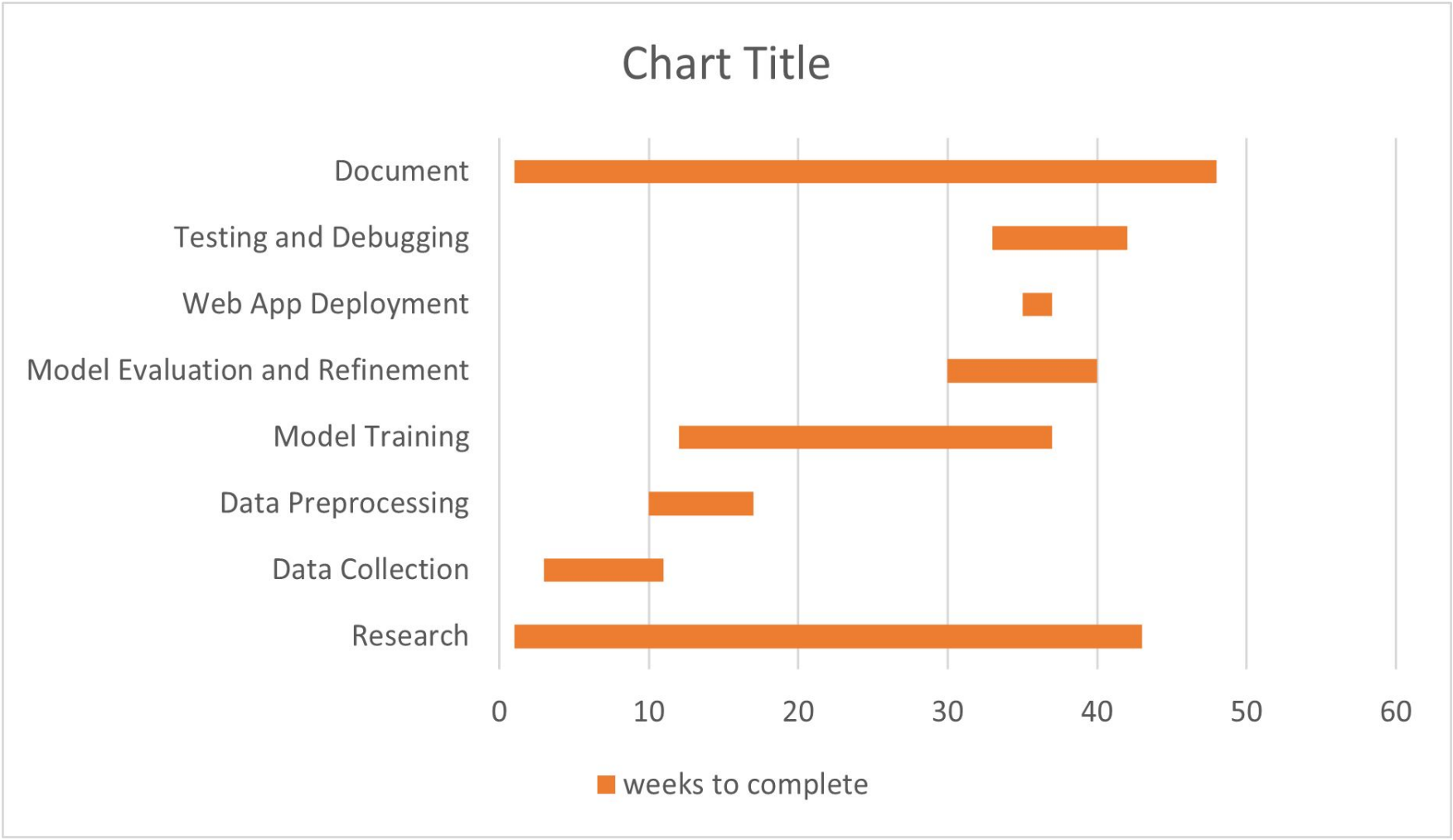
Generated Image:



Download your Font:

yourfont.tff

Project Schedule



Project Budget

Cost Domain	Expected Cost
Cloud	Rs 5000
Miscellaneous	Rs 4000
Total	Rs 9000

References

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