

Digital Text to Users Handwriting (தமிழ்)

C. Sunitharam, R. Subash, K. Prasannavenkatesan



Abstract: Converting digital text to handwriting is a simple process because of the abundance of software and websites that do it, like texttohandwriting.com. The Text to Handwriting Converter is a free artificial intelligence-based tool that translates computer text into handwritten text with ease. An individual's handwriting format is saved as an input, converted into text, and then shown as an output. Image processing techniques can be used to process the handwriting. It is possible to use the alphabets of specific languages, such as Tamil (தமிழ்), English, etc. The text of the input is finally displayed in the user's unique handwriting style. It will be useful in numerous ways, including helping the students who have been injured during an accident and it will also reducing the need for paper. Instead of using paper, we can preserve it and refer to it whenever needed. The primary goal of this project is to convert digital text into user handwriting in Tamil (தமிழ்), as it is the oldest language in India and there are currently no websites or apps that accomplish this specifically in Tamil (தமிழ்). There are 247 Tamil (தமிழ்) letters, which are divided into four groups: uyireluttu (உயிரெழுத்து) (12), meyyeluttu (மெய்யெழுத்து) (18), uyirmeyyeluttu (உயிர்மெய்யெழுத்து) (216), and finally ayutha eluttu (ஆய்த எழுத்து) (1). A database is created using the handwriting of the person whose handwriting is being converted. These databases consist solely of 247 letters written in that person's handwriting.

Keywords: Digital text, User's Handwriting, Image Processing, Tamil

I. INTRODUCTION

Our technology is constantly improving, and a lot of new concepts and experiments are emerging and succeeding as well. Among one of them is to convert digital text into the user's handwriting. The fact that many people still preferred writing with pens on paper, provided the inspiration for the project. The average individual writes 13 words per minute in their handwriting.

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The text can be typed in any document, PDF (Portable Document Format) etc., is what is known as digital text. Digital text is also considered as any sort of text entered into a computer, a smart phone, a tab, etc. Any method that is outlined for assigning a specific object from one (or the same) set to each object in another is known as mapping. The handwriting of the user is nothing but the handwriting of every individual person in the world.

There must be many different handwriting styles in existence like the one which provides a comparison between two stated decoding schemes based on CTC technique [6] and also an another technique which is attention-based model for end-to-end handwriting recognition is there. In this system does not require any segmentation of the input paragraph. The model is inspired by the differentiable attention models presented recently for speech recognition, image captioning or translation [7]. A digital text to user's handwriting conversion in Tamil (தமிழ்) involves changing typed text into the user's own handwriting. Each of the 247 Tamil (தமிழ்) letters is processed using image processing and mapping techniques, and the findings are compiled into a dataset.

1.1 OBJECTIVE

Writing is the practice of using symbols to convey thoughts and ideas (alphabetical letters, punctuation, and spaces). Writing is a daily habit, since everyone will either write something down or take notes. Our aim is to translate digital text entered in a given language into the user's handwriting from a database of the user's handwriting. There are many websites available to convert digital text to English language. Tamil is therefore picked in order to complete it in the local tongue

The conversion method from text to handwriting is simple and straightforward. The conversion will take place quickly once the text is imported to the input field, and the results will show up on the screen. There are numerous techniques for creating handwritten text from an input, but they all rely on prepared fonts, are only available for the English script, and allow to choose neither the font type nor the style for the output, which will always be shown in the default font style. This project is useful for producing handwritten Tamil script. The letters display typed digital text in a handwritten format and are based on a custom.

The literature review is the first phase in the software development process. Before developing any software to address the given problem statement, it is critical to assess the economic strength and time factor. Object detection is a technique that can be useful in many different fields.

II. LITERATURE SURVEY

Sl. No.	Reference	Year of Publication	Input	Study Aim	Algorithms	Technique	Specialty
1	Poorna Banerjee Dasgupta, India	2018	Text sample image was converted to grayscale, with pixel intensity values	To find the human behavioral analysis based on Handwriting Recognition and Text Processing	Algorithmic approach-analyzing human psychology through handwriting recognition and text pattern processing.	It suggests and discusses an algorithmic method for examining human behavioral traits using text processing and handwriting recognition with the aim of incorporating the discovered results into future artificial intelligence systems that can use text processing and handwriting recognition as individualistic signatory features [1].	forensic sciences, medical diagnosis, anthropological studies and criminal investigation
2	Junqing Yang, Peng Ren, Xiaoxiao Kong, China	2019	Preprocessing the handwriting character based on faster RCNN and character recognition based on the Convolutional Neural Networks	To Recognise the Handwriting text based on faster-rcnn	Fast-R-CNN	A deep learning-based handwriting text recognition method is provided to address the issues [2].	According to testing results, this method's accuracy is superior than that of classic OCR.
3	Tejasree Ganji , Muni Sekhar Velpuru , Raman Dugyala, India	2020	Created a dataset from collected data. And collected data from various people. divided the data as a testing dataset and training dataset. train the dataset using VGGNET-16	To recognize the multivariant handwritten Telugu character using transfer learning	deep Convolutional Neural Networks	To develop a character recognition system capable of DIA, which converts input texts into an electronic format automatically [3].	can instantly identify characters without the need for segmentation at all
4	Yash Khandelwal , India	2021	I am using IAM handwriting dataset, which already contains segmented documents into lines and word format.	To Extract Text from Image And Converting It To Digital Format	Digital Image Processing and Deep Learning algorithms	To scan handwritten text than currently available methods, or more accurately at the very least improve those methods [4].	To extract English handwritten text from photos, which is successfully done here by focusing mostly on preprocessing techniques such slant correction.
5	Geehyuk Lee, Jiseong Gu, Korea	2022	The user must put a text cursor where they want to insert the text and then write on a separate pop-up window that recognizes in	Towards More Direct Text Editing with Handwriting Interfaces	—	created and put into use a text editor for direct and indirect writing. Then we performed a test to evaluate the usefulness of both text editors [5].	Using the direct-writing interface, users' gaze movement distance and frequency could be decreased and constant time could be saved for each text editing process. Additionally, when quick and frequent text modification was necessary, participants favored the direct-writing interface.

III. PROPOSED SYSTEM

This section discusses how to connect digital text alongside user handwriting. This includes several steps for converting digital text into user's handwriting in Tamil:

- Handwriting Classification
- Mapping of Text with Handwriting
- Generation of Handwritten Image
- Exporting as PDF
- Handwriting Classification

The first and most crucial stage is to gather the Tamil handwriting of the relevant person; this can be done in the form of a picture. After gathering the user's handwriting, it must categorize the letters. Then utilizing an image processing technique, each and every Tamil letter must be processed as an image. Every letter needs to be handled separately.

- Mapping of Text with Handwriting

The fact that only the processed handwriting picture and the classified letter are combined or brought under the same heading by mapping approach makes this the most crucial phase in the entire module. mapping the Tamil letters to their corresponding, processed handwriting image.

- Generation of Handwritten Image

Creates each Tamil letter according to the user's input and the order of the image that is processed. Thesequence of the letters matters.

- Exporting as PDF

The final step of the process, rendering, which involves showing the result after collecting, classifying, processing, and mapping it, allows it to be exported as a PDF

i) Methodology

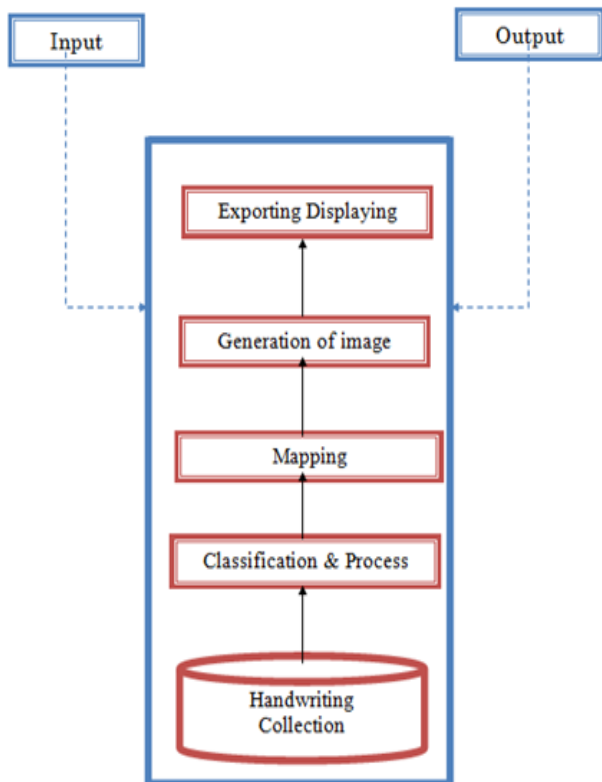


Fig. 1. Process Analyzing Diagram

A. Handwriting Collection

The first and most crucial stage is to gather the Tamil handwriting of the relevant person, this can be done in the form of a picture. Proper scanning of the picture in order to get the clear visual of the letters. More accuracy may be obtained the better the image becomes.

B. Classification and Process

Then utilizing an image processing technique, each and every Tamil letter must be processed as an image. Every letter needs to be handled separately and each letter must be positioned using a sprite array method.

C. Mapping Dictionary

A collection of pairs is stored in an abstract data structure called an associative array, map, symbol table, or dictionary in computer science. Each potential key only appears once in the collection.

Dictionary mapping refers to the process of storing a handwriting collection and Tamil text in an array and treating them as a dictionary. While doing the mapping process, the order of the processed image is important.

D. Generation of Image

Creates each Tamil letter according to the user's input and the order of the image processed. The sequence of the letters matters because by knowing the position of the processed image and the letter in the array it will generate the image.

E. Exporting Displaying

The final step of the process, rendering, which involves showing the result after collecting, classifying, processing, and mapping it, allows it to be exported as a PDF.

ii) Description of Dependencies

A. System

The using System line indicates that this project uses the System library, which provides certain helpful classes and functions, such as the WriteLine function or class. The namespace Project Name serves as a means of identifying and enumerating the code contained therein. It resembles Java's package. For organizing the codes, this is useful.

B. Unity Collection

Unmanaged data structures are provided by this package and can be used in burst-compiled programs and jobs. Additional data structures compatible with the Unity Jobs system are offered via the Collections Package. The components in this package expand upon Native Array, Native Slice, and other Unity components. Unity's core module includes the Collections namespace.

C. Unity Collections Generic

Consists of interfaces and classes that describe generic collections, allowing users to construct strongly typed collections with higher type safety and efficiency than non-generic strongly typed collections.

D. LINQ

A technology from C# called LINQ has a wide range of applications. Data querying from any source database is one of the key goals. You must add the System. LINQ namespace in order to use LINQ. Additionally, you can use LINQ to write methods in C#. The C# query language LINQ (Language Integrated Query) uses a standard query syntax to get data from many sources and formats.

Due to its integration with C#, it no longer causes a mismatch between programming languages and databases and offers a unified querying interface for many data sources.

E. Resource

Resource Folders are groups of assets that are part of the Unity player when it is built, although they are not always connected to any Game Objects in the Inspector.

F. Unity Editor

In Unity, the editor-specific APIs (Application Programming Interface) are implemented by the editor assembly. It cannot be referred to by players' runtime code.

G. Unity Engine

Games in two and three dimensions, as well as interactive simulations and other experiences, can be made using the engine. The United States Armed Forces, the film, automotive, architectural, engineering, and construction industries, among others, have all used the engine.

H. Mono Behavior

Unity is informed by the Mono-Behavior, from which class each class derives. A key component of object-oriented programming (OOP), inheritance provides a number of particular capabilities. It enables objects to share similar functionality and permits treating descendants as if they were members of the base class. The wiki page on this characteristic, known as polymorphism, provides a decent explanation. In JavaScript, you don't have to explicitly declare classes, whereas in C# you usually do.

iii) Algorithm

The process of rendering involves creating an image using two- or three-dimensional data that has been stored in the computer. It's seen as a creative process as well, similar to photography. It is possible to render sprite-type pictures in a 2D or 3D scene using Unity's Sprite Renderer. With the help of this component, users can display photos as Sprites for usage in 2D or 3D situations. The process of rendering involves creating a 2D image from 3D geometry, lighting, materials, and camera data.

Rendering could be further split into three topics:

- Real-time rendering aims to provide an image of the highest quality as soon as feasible. usually applied to interactive applications like video games
- Photoreal- The aim of photoreal rendering is to create images that are identical to photographs.
- NPR (Non-Photoreal)- NPR is the abbreviation for all other rendering techniques whose objective is not to create photorealism.

Real Time Algorithms

Real-time rendering aims to produce an image of the best quality as quickly as is practical. It is frequently employed in interactive software, such as video games. In this case, when the text was being written or input, it was converted into handwriting in real time by selecting the right processed image from the user's handwriting database. Consequently, a real-time rendering technique is used.

iv) PROPOSED ARCHITECTURE

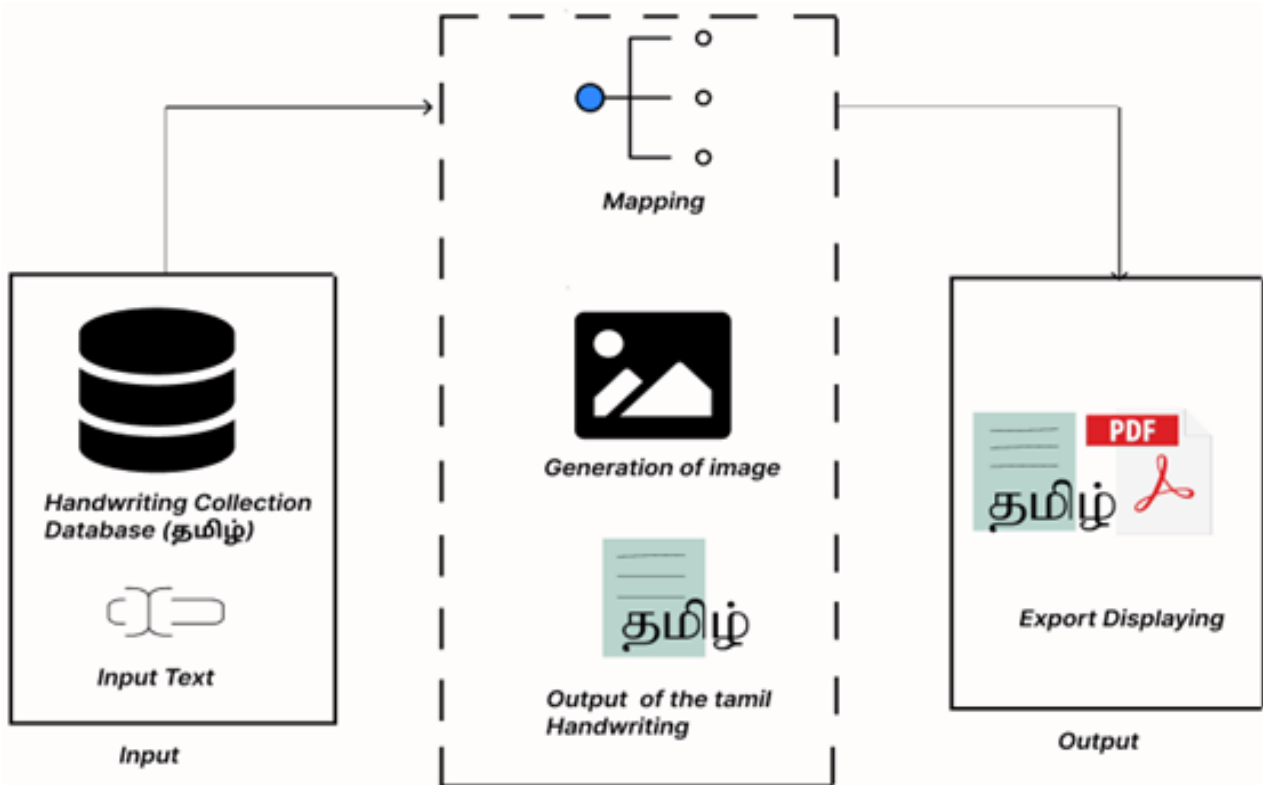


Fig. 2. Proposed Architecture Diagram

IV. RESULT

The digital text is transformed into handwritten Tamil notes. Utilizing Unity2D is achieved by the process of gathering or collecting the user's handwriting of a Tamil language as a database which is the important process because the main aim of the project is to display the digital text in User's handwriting. So the required output or the digital text is converted into user's handwriting (தமிழ்) by the process of Classification of image, Mapping of words, Generation of image. Finally, the output has been exported as pdf.

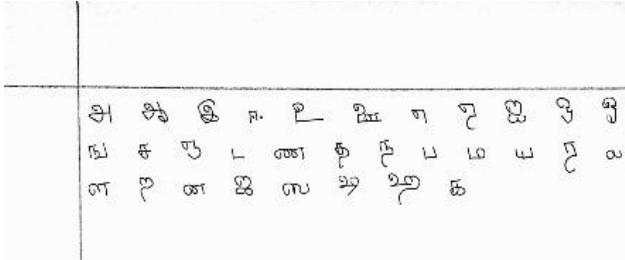


Fig. 3. User's Handwriting

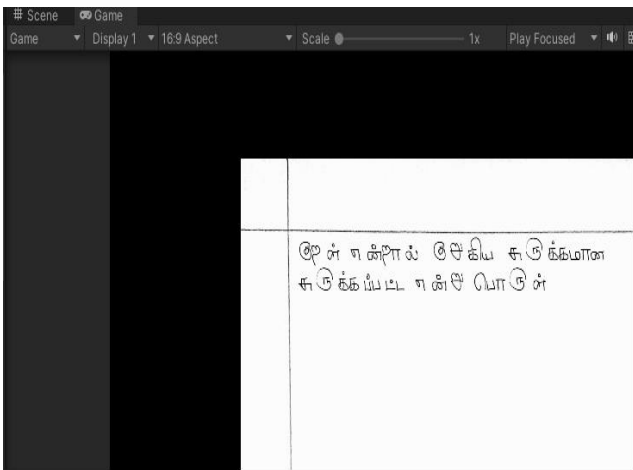


Fig. 4. Digital text to User's Handwriting in Tamil

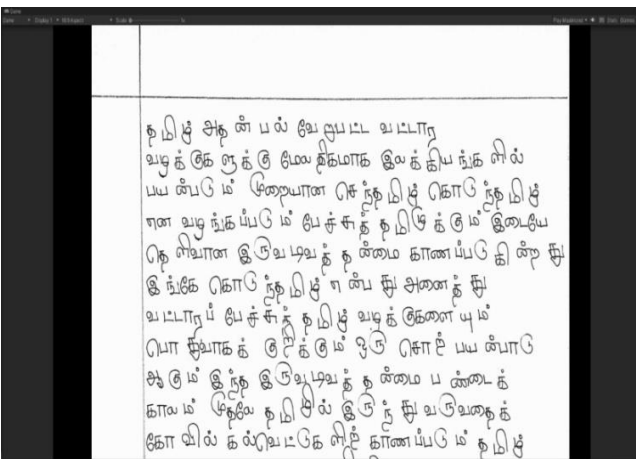


Fig. 5. Exported as PDF

V. CONCLUSION

Digital Text to Handwriting has drawn a lot of interest because of its many uses. In particular, for Tamil and many other native languages, it is still at the development stage. This decreases the need for paper and means that there is no longer need to use a stylus when writing on a tab. It will be difficult to eventually achieve this for the English language,

particularly for cursive handwriting. This will be important in the future because of the necessity of the user's handwriting.

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Authors Contributions	The project's main author, R. Subash, handled the image generation and mapping process. Additionally, the Handwritten Data is created by him. The co-author, K. Prasannavenkatesan, carried out the research and also exported the finished version as a PDF. Our mentor, Dr. C. Sunitharam, assists us in achieving a better project output.

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