

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 is saved as input, converted into text, and then displayed as 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) and English, among others. The text of the input is finally displayed in the user's unique handwriting style. It will be helpful in numerous ways, including helping students who have been injured during an accident, and it will also reduce 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 specifically accomplish this in Tamil (தமிழ்). There are 247 Tamil (தமிழ்) letters, which are divided into four groups: uyireluttu (உயிரெழுத்து) (12), meyveluttu (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 evolving, and numerous new concepts and experiments are emerging and succeeding as well. Among them is the ability to convert digital text into the user's handwriting. The fact that many people still preferred writing with pens on paper inspired the project. The average individual writes 13 words per minute in their handwriting.

Manuscript received on 31 January 2023 | Revised Manuscript received on 13 February 2023 | Manuscript Accepted on 15 March 2023 | Manuscript published on 30 March 2023. *Correspondence Author(s)

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The text can be typed in any document, such as a PDF (Portable Document Format), etc., and is what is known as digital text. Digital text is also considered any sort of text entered into a computer, smartphone, tablet, 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 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 the CTC technique [6] and also an another technique which is attention-based model for end-toend handwriting recognition is there. This system does not require segmenting the input paragraph. The differentiable attention models inspire the model presented recently for speech recognition, image captioning or translation [7]. A digital text-to-user's handwriting conversion in Tamil (\mathfrak{GLDij}) involves converting typed text into the user's handwriting. Each of the 247 Tamil (\mathfrak{GLDij}) 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. We aim 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 that can convert digital text into English. Tamil is therefore picked to complete it in the local tongue.

The conversion method from text to handwriting is simple. The conversion will occur quickly once the text is imported into the input field, and the results will appear on the screen. There are numerous techniques for creating handwritten text from an input. Still, they all rely on prepared fonts, are only available for the English script, and do not allow the user to choose either the font type or the style for the output, which will always be shown in the default font style.

This project helps produce 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 crucial to assess the economic feasibility and time constraints. Object detection is a technique that can be applied in various fields.



Retrieval Number: 100.1/ijsce.A35880313123 DOI: <u>10.35940/ijsce.A3588.0313123</u> Journal Website: <u>www.ijsce.org</u>

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II. LITERATURE SURVEY

SI. No.	Reference	Year of Publication	Input	Study Aim	Algorithms	Technique	Specialty
1	Poorna Banerjee Dasgupta, India	2018	The text sample image was converted to grayscale, with pixel intensity values.	To find the human behavioral analysis based on Handwriting Recognition and Text Processing	Algorithmi c approach- analyzing human psychology through handwriting recognition and text pattern processing.	It suggests and discusses an algorithmic method for examining human behavioural traits using text processing and handwriting recognition, to incorporate the discovered results into future artificial intelligence systems that can utilise 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 R- CNN and character recognition based on Convolutional Neural Networks	To recognise the Handwriting text based on Faster R-CNN	Fast-R- CNN	A deep learning-based handwriting text recognition method is provided to address the issues [2].	According to the testing results, the accuracy of this method surpasses 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 individuals, dividing it into a testing dataset and a training dataset. Train the dataset using VGGNET-16.	To recognize the multivariate handwritten Telugu character using transfer learning	Deep Convolutio nal 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 the IAM handwriting dataset, which already contains segmented documents in line and word formats.	To Extract Text from an Image And Convert It To a Digital Format	Digital Image Processing and Deep Learning algorithms	To scan handwritten text better 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 achieved here by focusing primarily on preprocessing techniques, such as 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 in a separate pop- up window that recognizes it	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 can be reduced, allowing for a constant amount of time to be saved for each text editing process. Additionally, when quick and frequent text modifications were necessary, participants favoured 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 the user's handwriting in Tamil:

- Handwriting Classification ٠
- Mapping of Text with Handwriting •
- Generation of Handwritten Image •
- Exporting as PDF ٠
- Handwriting Classification •

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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 collecting the user's handwriting, it must categorize the letters. Then, utilising an image processing technique, each 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 the mapping approach makes this the most crucial phase in the entire module. Mapping the Tamil letters to their corresponding processed handwriting images.

• Generation of Handwritten Image

Creates each Tamil letter according to the user's input and the order in which the image is processed. The sequence 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, with proper scanning to obtain a clear visual of the letters. More accuracy may be obtained as the image improves.

B. Classification and Process

Then, utilising an image processing technique, each Tamil letter must be processed as an image. Every letter needs to be

Retrieval Number: 100.1/ijsce.A35880313123 DOI: <u>10.35940/ijsce.A3588.0313123</u> Journal Website: <u>www.ijsce.org</u> 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. During the mapping process, the order in which the processed image is presented is crucial.

D. Generation of Image

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

E. Exporting Displaying

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

ii) Description of Dependencies

A. System

The 'using System' line indicates that this project utilises the System library, which provides various 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

This package provides unmanaged data structures that can be used in burst-compiled programs and jobs. The Collections Package provides additional data structures that are compatible with the Unity Jobs system. 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 a key goal. You must add the System. LINQ namespace to use LINQ. Additionally, you can use LINQ to write methods in C#. The C# query language LINQ (Language-Integrated Query) utilises a standard query syntax to retrieve data from various sources and formats.

Due to its integration with C#, it eliminates mismatches between programming languages and

databases, providing a unified querying interface for various data sources.

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12

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. Players' runtime code cannot refer to it.

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-Behaviour, from which each class derives. A key component of object-oriented programming (OOP), inheritance offers several distinct 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 variables, 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 also seen as a creative process, 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
- Photorealistic Photorealistic rendering aims to create images that are indistinguishable from 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.



Fig. 2. Proposed Architecture Diagram



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IV. RESULT

The digital text is transformed into handwritten Tamil notes. Utilising Unity2D is achieved by the process of gathering or collecting the user's handwriting in the Tamil language as a database, which is an essential process because the main aim of the project is to display digital text in the user's handwriting. The required output, or digital text, is converted into the user's handwriting (தமிழ்) through a process that involves image classification, word mapping, and image generation. Finally, the output has been exported as a PDF.

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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 garnered considerable interest due to its numerous applications. In particular, for Tamil and many other native languages, development is still in progress. This reduces the need for paper and eliminates the requirement for a stylus when writing on a tablet. It will be challenging to achieve this for the English language,

Retrieval Number: 100.1/ijsce.A35880313123 DOI: <u>10.35940/ijsce.A3588.0313123</u> Journal Website: <u>www.ijsce.org</u> particularly in cursive handwriting. This will be important in the future because of the necessity of the user's handwriting.

ACKNOWLEDGMENT

The authors would like to thank Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya (SCSVMV) Deemed to be University for its support of this work.

DECLARATION

Funding/ Grants/ Financial Support	No, I did not receive.
Conflicts of Interest/ Competing Interests	No conflicts of interest to the best of our knowledge.
Ethical Approval and Consent to Participate	No, the article does not require ethical approval or consent to participate, as it presents evidence that is not subject to interpretation.
Availability of Data and Material/ Data Access Statement	Not relevant.
Authors Contributions	The project's primary 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, helps us achieve a better project outcome.

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