RECOGNITION OF KANNADA INSCRIPTIONS USING IMAGE PROCESSING TECHNIQUES

[1]Dr Hamela K

[1]Assistant Professor, Department of Computer Science, Government First Grade College, Malur 563160, India.

Abstract :　Ancient photographs and documents must be digitally preserved in today's world since they disclose the cultural history and help to preserve and highlight the past of our nation. The analysis and digitization of traditional cultures and heritages are aided by a recognition system. The digitizing process in this instance involves identifying antiquated photographs from both online and offline sources. In order to retrieve, categorize, and extract information from ancient inscriptions written in a range of languages, this paper explores a variety of image-processing methodologies and techniques.

Index Terms -　**Kannada Inscriptions, Image processing, Character Recognition Component.**

I. INTRODUCTION

The primary sources for learning about the history and culture of ancient civilizations are inscriptions and manuscripts. Epigraphy is the study of inscriptions. Rocks, pillars, stones, slabs, building walls, and temple bodies are all covered in inscriptions. Copper plates and seals also contain them. Inscriptions come in all shapes and sizes. Several provide the general public with information about the monarchy's religious, administrative, and major decisions. It serves as essential documentary evidence for establishing engraving-based legal, social-cultural, archaeological, literary, and historical relics. The Survey on Indian Epigraphy's top-ranked list is Inscriptions of South India [1]. From the third century before Christ onward, there are inscriptions written in Kannada. Kannada is an ancient language that comes from the Brahmi script and is spoken in the southern part of the Indian subcontinent and some South Asian countries.

For historical documents, a typical digitization procedure entails capturing the originals, followed by contrast enhancement of the images, segmentation, character identification, and research. The digitization of historical documents is a challenging task since they are written in very complex and unfamiliar archaic handwriting and have suffered considerable degradation [1]. The foreground text must be preserved while the background noise is removed; therefore, contrast enhancement of these photographs is both a necessary and straightforward operation. These photos are difficult to accurately segment because of their curved baselines, jumbled text line bounds, and overlapping and broken letters. Character recognition in these manuscripts is far more difficult than it is in modern scripts because of the strange antique script and extensive character set [2].

This paper presents the identification of Kannada Inscriptions using image processing techniques. Chapter II presents Literature reviews in this field, whereas Chapter III discuss the role of image processing. Chapter IV talks about various image processing used in recognizing Kannada Inscription Chapter V discuss about the conclusion of article and its future scope.

II. RELATED WORK

Jayanthi N [3] et. al., proposes a technique of enhancing and binarizing historical inscription photos addressed using a cutting-edge technique. By viewing the issue as blind source separation, the suggested strategy offers an appropriate way to separate the text layer from the historical inscription images. T.Mangandan[4] et. al., focus on Pre-processing and segmentation performed on the inscription pictures obtained from the Tamil Nadu Archaeological Department. The color photos were transformed to grayscale and binary images during segmentation based on threshold values. Thus, the major issues with reading the inscription images can be resolved by the proposed system. Rajithkumar B K [5] et. al., present work about a template containing the most recent studies regarding the characters from the Hoysala and Ganga eras. Based on the character's mean, standard deviation, and total absolute difference values, it can be recognized. In the current Kannada script, the appropriately recognized characters are converted. An experimental finding shows that antique Kannada stone inscriptions can be recognized with high accuracy and increased time efficiency. C. M. Nrupatunga[6] et. al., with this study method, stone engraving characters can be easily converted to digital format

utilizing a smartphone's standard camera. The system used in this study is simple and effective at eliminating noise and detecting words present in inscriptions that are blurred, destroyed, dust-shrouded, or unprotected old stone inscriptions.

III. IMAGE PROCESSING

The process of applying a variety of procedures to an image to either enhance it or extract some pertinent information from it is known as image processing. It is a type of signal processing in which an image is the input and features or characteristics from that image are the output. Picture handling is one of the advancements that are as of now growing rapidly. In the fields of engineering and computer science, it is a major focus of study [2].

The three main steps in image processing are as follows: importing the image using software for image acquisition; breaking down and changing the picture, and modifying an image or report as a result of the analysis. In a variety of industries, including photography, design, marketing, advertising, and more, digital image processing is widely employed. Digital image processing has numerous widespread uses in the medical industry, including X-ray imaging, PET scans, and UV imaging. Remote sensing in space entails using satellites to survey the Earth and take note of any spacecraft movements [3]. Another usage of digital image processing is machine vision, sometimes known as robot vision. Plant disease detection is one of the most popular uses of image processing. Although it takes a lot of time, digital picture processing can improve people's quality of life [4].

Techniques for image processing fall into two categories: analog and digital.

Analog image processing: Typically, prints and physical copies like photographs employ analog image processing. When applying these visual methods, image analysts apply a variety of interpretation strategies.

Digital image processing techniques are useful for analyzing and modifying digital images. Digital image processing enables users to extract helpful information and save it in several formats in addition to enhancing and encoding photos. The main focus of this article is on digital image processing methods and stages.
.

IV. VARIOUS TECHNIQUES OF IMAGE PROCESSING FOR RECOGNIZING KANNADA INSCRIPTION

a. Old Kannada Stone Inscriptions Characters Using MSDD Algorithm

In the present work, we propose Mean, Standard Deviation, and Sum of Absolute difference Algorithm (MSDDA) to recognize Hoysala and Ganga periods characters [5]. The Hoysala and Ganga periods' stone inscription characters are maintained in this work's database in the.jpg and. wave formats. Any character from the test image may be selected by the user. When they choose at that point, it preprocesses those characters, segments them, and extracts their features [5]. The method calculates the mean and standard deviation of the related characters based on the retrieved features, compares those values to database characters, and then determines which characters they correspond to.

b. Enhancement of Inscription Images

Using 650-word pictures, a unique technique for improving difficult-to-read archaeological inscription photos has been improved and confirmed [7]. The suggested technique establishes NGFICA's significant contribution to digitizing inscription images, which barely distinguish between text and Non-text area and the text's outer margins are both blurred. Word and character recognition accuracy were increased by the approach from 10.1% to 75.4% and 32.4% to 86.7%, respectively [7]. The technique was effective at improving photographs of multilingual inscriptions as well.

c. Characterization and Recognition of Stone Inscription

Following are the steps in the suggested procedure:

A. Create a database of the present Kannada alphabets and the equivalent Kadamba, Chalukya, Hoysala, and Vijayanagara phase alphabets in jpg or bmp format.

B. Test image: Using a digital camera, take a photo of a stone inscription where the characters are legible [8].

C. Binarization: To transform a grayscale image into a binary image, a global threshold that distinguishes the background from the foreground must be chosen.

D. Character segmentation: Line and character segmentation are done using the connected component method. When a black pixel appears, it recognizes the whole character by connecting its components. Segmenting this letter and computing its centroid. Similarly, the centroids of each character are computed after segmentation [8].

d. Era Identification and Recognition of Stone In-scripted Kannada Characters

Various ancient Kannada input images collect characters from stones from different eras' inscriptions [9].

The database is created by trimming collected individual characters' pictures. Another character from the same era is Cropped and grouped under the "Personal" folder for training [10]. A mix of all characters from different eras grouped in the same folder for testing A query image is selected from there. to display the current state Century symbol, current-century Kannada letters are also collected. Cropped and grouped in separate folders.

V. CONCLUSION

Stone inscriptions are one of the key historical pieces of evidence of the literature and culture of that region over time. The ability to identify and interpret stone inscriptions plays an important role in determining the age of the stone and the meaning of the stone inscriptions. A proper digitization and recognition technique is a prerequisite and desired. In this paper, we discussed the recognition of Kannada inscriptions using Image Processing. Through Image processing techniques, we would be able to recognize various inscriptions available in Kannada.

REFERENCES

[1] ICVGIP '14: Proceedings of the 2014 Indian Conference on Computer Vision Graphics and Image Processing, December 2014, Article No.: 51, Pages 1–6. https://doi.org/10.1145/2683483.2683534.

[2] P. Bannigidad and C. Gudada, "Restoration of degraded Kannada handwritten paper inscriptions (Hastaprati) using image enhancement techniques," 2017 International Conference on Computer Communication and Informatics (ICCCI), Coimbatore, India, 2017, pp. 1-6, doi: 10.1109/ICCCI.2017.8117697.

[3] Indu Sreedevi, Rishi Pandey, N. Jayanthi, Geetanjali Bhola, Santanu Chaudhury, "NGFICA Based Digitization of Historic Inscription Images", International Scholarly Research Notices, vol. 2013, Article ID 735857, 7 pages, 2013. https://doi.org/10.1155/2013/735857

[4] T. Manigandan, V. Vidhya, V. Dhanalakshmi and B. Nirmala, "Tamil character recognition from ancient epigraphical inscription using OCR and NLP," 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS), Chennai, India, 2017, pp. 1008-1011, doi: 10.1109/ICECDS.2017.8389589.

[5] Rajithkumar B K, H. S. Mohana, Uday J, Bhavana M B and Anusha L S, "Read and recognition of old Kannada stone inscriptions characters using novel algorithm," 2015 International Conference on Control, Instrumentation, Communication and Computational Technologies (ICCICCT), Kumaracoil, India, 2015, pp. 284-288, doi: 10.1109/ICCICCT.2015.7475291.

[6] C. M. Nrupatunga, K. L. Arunkumar,"Peruse and Recognition of Old Kannada Stone Inscription Characters", Springer Singapore, 2021

[7] Sreedevi, I., Pandey, R., jayanthi, N., Bhola, G., & Chaudhury, S. (2013). Enhancement of inscription images. 2013 National Conference on Communications (NCC). doi:10.1109/ncc.2013.6488017

[8] Puneeth, Shashwathi, Nayaka M, Sridevi M, Varsha S, "Characterization and Recognition of Stone Inscription", IJRECE VOL. 7 ISSUE 2 (APRIL- JUNE 2019) ISSN: 2393-9028

[9] Sachin S Bhat , H.V. Balachandra Achar, "Character recognition and Period prediction of ancient Kannada Epigraphical scripts", International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, Vol. 3, Special Issue 1, February 2016.

[10] "Era Identification and Recognition of Stone In-scripted Kannada Characters Using Artificial Neural Networks", International Journal of Engineering Research & Technology (IJERT)IJERT, ISSN: 2278-0181, Page 178 - 186