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An Android App for Recognition and Mapping of Chinese Character with English

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***Abstract* — Today because of headway in innovation and quick web the world has turned into a little place. All types of information are accessible in only a couple clicks. However, the information can't simply be English or any local dialect we know yet in an assorted frame from different outside dialects. At that point rises the trouble in comprehension the dialects e.g Chinese which is an extremely convoluted dialect in its two structures straightforward Chinese and conventional. To take care of this issue, we have proposed a system utilizing PC and Android portable together to perform Chinese character acknowledgment. System is partitioned into two section, in first stage it will remove elements of Chinese characters which have taken from android portable camera with the assistance of SIFT and store them in a dataset. In second stage, Powerful OCR (Optical character acknowledgment) is utilized to coordinate the elements and also separation between them. Toward the end, it will change over the perceived characters in English as well as show it on the versatile.**

Keywords — Feature Extraction, OCR, TTS, Character Recognition

I. INTRODUCTION

A versatile Chinese character acknowledgment stage is significant. To start with, it is very helpful to utilize the telephone camera of the portable to catch some new Chinese characters, particularly customary characters when perusing exemplary Chinese books. Second, although there are numerous prevalent versatile Chinese acknowledgment applications, for example, YunMai, DaubNotethe, CamScanner and ABBYY TextGrabber, exactness is not high. It has much space for further development. The reasons are complex:

a. The structure of a Chinese character can be extremely confused.
b. The monstrous Chinese characters en sexes impressive calculation and capacity cost.
c. What components to speak to the character picture and how to pack the capacity of elements to suit the versatile stage.
d. The efficient technique look closest neighbor in high-dimensional space will be connected in acknowledgment system, which ought to have high exactness and smooth experience appeared to clients. So the component extraction and the perceiving strategy are two vital issues to be considered in the stage.

For the element extraction, there fundamentally exist two classifications of highlight for picture representation: worldwide element and neighborhood include. Significance descriptor was at first proposed in [1] and broadly utilized as a part of substance based picture recovery [2]. It is demonstrated that descriptor can depict a picture by an arrangement of low dimensions, which is additionally extremely discernable while portraying Chinese characters. Y. Lin et al. utilized descriptor to speak to Chinese calligraphy characters in [3] to perceive substantial scale Chinese calligraphic characters. Next to the worldwide component, nearby elements are likewise received in numerous applications. Filter descriptor is made by David Lowe in [4] to speak to the picture which has been ended up being the one of the best nearby component descriptors [5]. Be that as it may, the quantity of SIFT keypoints in one character picture frequently changes from tens to hundreds. In the event that the Chinese characters library is much bigger, the acknowledgment will offer ascent to the inconceivable computational cost. SIFT descriptors are high-dimensional vectors, so the productive closest neighbor seek calculations are required to enhance the execution when question in enormous dataset. It basically isolated into two classifications: hashing strategies and tree-based techniques. For hashing technique, Spectral Hashing (SH) proposed by Weiss et al.[6] is successful in hashing look, which is broadly utilized as a part of high dimensional ordering and hunt [7]. There exist many tree based techniques e.g. [8]. The randomized k-d tree is demonstrated best at quick surmised seek in high dimensional spaces [9].

This paper applies these well known techniques in Chinese character acknowledgment and look at the execution and precision. With respect to the acknowledgment method, the execution of acknowledgment ought to be meet the impediment of cell phones. In spite of the fact that the inquiry calculations said before are speedy in coordinating, the calculation is likewise substantial because of the capacity of highlight vectors, which can be more than 10GB. So it would be awesome if a technique can pack the capacity of highlight vectors and keep their legitimacy. Shaknarovich and Darell [10] proposed a Similarity Sensitive Coding(SSC) calculation, whose key commitment is making another parallel component space mapped by hash capacities gained from preparing set. To accelerate coordinating and decrease memory utilization, Calonder M [11] utilized double (0 and 1) strings as a component descriptor, the descriptor similitude can be assessed utilizing the Hamming separation and yield a comparable or better acknowledgment execution.

The primary commitment of this paper can be outlined as taking after perspectives: We gather the data of Chinese characters from the Internet to assemble the most entire Chinese character information set. In the interim, we assemble the picture library concurring that set. With the impediment of cell phones, we utilize SSC calculation to change over the component vectors to double codes, which is additionally keep the attributes of highlight. We channel SIFT purposes of comparative pictures acquired by GIST coordinating to diminish the calculation. In the acknowledgment, we consolidate SIFT highlight together to enhance the exactness. Apply diverse high-dimensional inquiry calculations in Chinese character acknowledgment and execute the android application utilizing the best one.

II. LITERATURE SURVEY

The most broadly utilized calculation for closest neighbor inquiry is the kd-tree (Freidman et al., 1977), which functions admirably for correct closest neighbor seek in low dimensional information, however rapidly loses its viability as dimensionality increments. Arya et al. (Arya et al., 1998) change the first kd-tree calculation to utilize it for estimated coordinating. They force a bound on the precision of an answer utilizing the thought of rough closest neighbor: a point p 2 X is a Ɛ inexact closest neighbor of an inquiry point q 2 X, if dist(p,q) • (1+ε)dist(p*,q) where p* is the genuine closest neighbour. The creators likewise propose the utilization of a need line to accelerate the pursuit in a tree by going by tree hubs all together of their separation from the question point. Beis and Lowe (Beis and Lowe, 1997) depict a comparable kd-tree based calculation, yet utilize a halting paradigm in light of looking at a settled number Emax of leaf hubs, which can give preferred execution over the Ɛ-rough cutoff. Silpa-Anan and Hartley (Silpa-Anan and Hartley, 2008) propose the utilization of numerous randomized kd-trees as a way to accelerate rough closest neighbour look. They perform just restricted tests, yet we have discovered this to function admirably over an extensive variety of issues.

Fukunaga and Narendra (Fukunaga and Narendra, 1975) suggest that closest neighbor coordinating be performed with a tree structure developed by bunching the information focuses with the k-implies calculation into k disjoint gatherings and afterward recursively doing likewise for each of the gatherings. The tree they propose requires a vector space since they process the mean of every bunch. (Brin, 1995) proposes a comparative tree, called GNAT, Geometric Near-neighbour Access Tree, in which he utilizes a portion of the information focuses as the group focuses as opposed to registering the bunch mean focuses. This change permits the tree to be characterized in a general metric space.

Liu et al. (Liu et al., 2004) propose another sort of metric tree that permits a cover between the offspring of every hub, called the spill-tree. Nonetheless, our analyses so far have found that randomized give higher execution while requiring less memory. Nister and Stewenius (Nister and Stewenius, 2006) show a quick technique for closest neighbor include look in vast databases. Their technique depends on getting to a solitary leaf hub of a various leveled k-implies tree like that proposed by Fukunaga and Narendra (Fukunaga and Narendra, 1975). In (Leibe et al., 2006) the creators propose a productive technique for grouping and coordinating components in vast datasets. They think about a few bunching strategies: k-implies grouping, agglomerative grouping, and a joined partitional-agglomerative calculation. Thus, (Mikolajczyk and Matas, 2007) assesses the closest neighbor coordinating execution for a few tree structures, including the kd-tree, the various leveled k-implies tree, and the agglomerative tree. We have utilized these examinations to manage our decision of calculations.

III. PROBLEM STATEMENT

Individuals may have difficulty in perusing Chinese books on the grounds that there dependably exist some new Chinese characters, so it would be significant if an application can help clients including outsiders to learn them. This venture shows a stage in light of cell phones for peopling to perceive the new characters whenever or wherever.

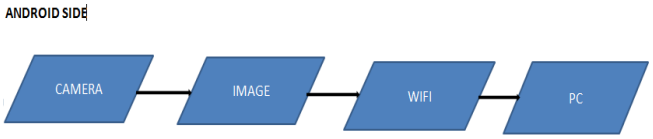
IV. PROPOSED SYSTEM FRAMEWORK AND ARCHITECTURE

A. Module 1

Collecting Data

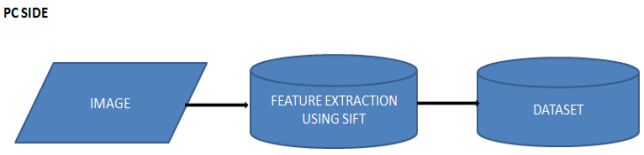
We are extracting image library of english and chinese characters from internet with the help of crawler.After extracting character we are converting characters into pdf or image format with help of data cleaning and digitization.

B. Module 2



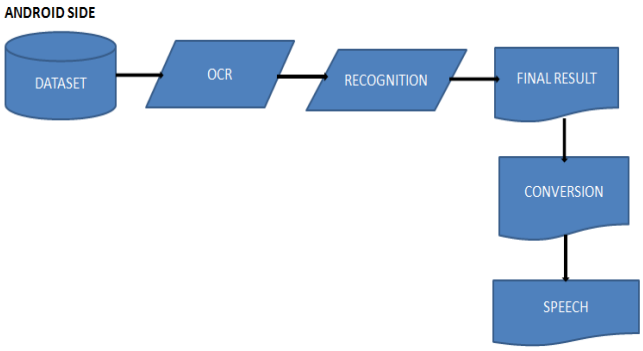
At ANDROID side we are taking image through camera and transfer that image to PC with using WiFi connection.

C. Module 3



At PC side we are extracting the SIFT features of image and store it in dataset.

D. Module 4



Again at ANDROID side we are detecting the image using OCR and after that recognizing and converting the particular character we get a final result in the form of text or speech.

V. ALGORITHM

SIFT (Scaling Invariant Feature Transform): They are turn invariant, which implies, regardless of the possibility that the picture is pivoted, we can locate similar corners. It is evident on the grounds that corners remain corners in turned picture too. Be that as it may, shouldn't something be said about scaling? A corner may not be a corner if the picture is scaled. For instance, check a basic picture beneath. A corner in a little picture inside a little window is at when it is zoomed in a similar window. So Harris corner is not scale invariant. In this way, in 2004, D.Lowe, University of British Columbia, concocted another calculation, Scale Invariant Feature Transform (SIFT) in his paper, Distinctive Image Features from Scale-Invariant Keypoints, which extricate keypoints and figure its descriptors. (This paper is straightforward and thought to be best material accessible on SIFT. So this clarification is only a short synopsis of this paper). There are fundamentally four stages required in SIFT calculation. We will see them one-by-one.

A. Scale space exstream recognition

From the picture above, clearly we can't utilize a similar window to recognize keypoints with various scale. It approves of little corner. Be that as it may, to distinguish bigger corners we require bigger windows. For this, scale-space sifting is utilized. In it, Laplacian of Gaussian is found for the picture with different qualities. LoG goes about as a blob indicator which recognizes blobs in different sizes because of progress in . To put it plainly, goes about as a scaling parameter. For eg, in the above picture, gaussian portion with low gives high esteem for little corner while guassian piece with high fits well for bigger corner. In this way, we can locate the neighborhood maxima over the scale and space which gives us a rundown of (x,y,) qualities which implies there is a potential keypoint at (x,y) at scale. In any case, this LoG is somewhat exorbitant, so SIFT calculation utilizes Difference of Gaussians which is a guess of LoG. Contrast of Gaussian is gotten as the distinction of Gaussian obscuring of a picture with two diverse , let it be and k. This procedure is accomplished for various octaves of the picture in Gaussian Pyramid. When this DoG are discovered, pictures are scanned for nearby extrema over scale and space. For eg, one pixel in a picture is contrasted and its 8 neighbors and additionally 9 pixels in next scale and 9 pixels in past scales. In the event that it is a neighborhood extrema, it is a potential keypoint.It fundamentally implies that keypoint is best spoken to in that scale. With respect to parameters, the paper gives some exact information which can be compressed as, number of octaves = 4, number of scale levels = 5, introductory =1.6, k=2 and so forth as ideal qualities.

B. Keypoint restriction

When potential keypoints areas are observed, they must be refined to get more exact outcomes. They utilized Taylor arrangement development of scale space to get more precise area of extrema, and if the force at this extrema is not exactly an edge esteem (0.03 according to the paper), it is rejected. This edge is called contrast Threshold in OpenCV DoG has higher reaction for edges, so edges likewise should be expelled. For this, an idea comparative to Harris corner identifier is utilized. They utilized a 2x2 Hessian network (H) to process the principal ebb and flow. We know from Harris corner identifier that for edges, one eigen esteem is bigger than the other. So here they utilized a basic capacity, If this proportion is more prominent than an edge, called edge Threshold in OpenCV, that keypoint is disposed of. It is given as in paper. So it wipes out any low-differentiate keypoints and edge keypoints and what remains is solid intrigue focuses.

C. Orientation Assignment

Presently an introduction is appointed to each keypoint to accomplish invariance to picture pivot. An area is taken around the keypoint area relying upon the scale, and the inclination size and bearing is ascertained in that locale. An introduction histogram with 36 receptacles covering 360 degrees is made. (It is weighted by angle size and gaussian-weighted roundabout window with equivalent to 1.5 circumstances the size of keypoint. The most noteworthy crest in the histogram is taken and any crest over 80.

D. Keypoint Descriptor

Presently keypoint descriptor is made. A 16x16 neighborhood around the keypoint is taken. It is isolated into 16 sub-pieces of 4x4 size. For every sub-piece, 8 container introduction histogram is made. So an aggregate of 128 canister qualities are accessible. It is spoken to as a vector to frame keypoint descriptor. Notwithstanding this, few measures are taken to accomplish power against brightening changes, pivot and so on.

E. Keypoint Matching

Keypoints between two pictures are coordinated by distinguishing their closest neighbors. Be that as it may,

sometimes, the second nearest match might be exceptionally close to the first. It might happen because of commotion or some different reasons. All things considered, proportion of nearest separation to second-nearest separation is taken. On the off chance that it is more prominent than 0.8, they are rejected. It eliminators around 90.

VI. REQUIREMENTS

A. User Interfaces

In our framework we give GUI, for example:- To interfacing advanced mobile phone and PC For catching character pictures. For separating SIFT highlights. For Matlab classes in java. For taking care of machine learning utilizing WEKA as a part of java. For survey datasets. For review perceived characters.

B. Hardware interfaces:

There will be few equipment interfaces to the framework Camera to catch pictures. Speaker for discourse module.

C. Programming Interface:

There are few programming interfaces for the framework :- Android working framework ought to be available. Android sdk apparatuses ought to be introduced for advancement. Android Studio ought to be available for advancement. ADT module for shroud to interface with android. Netbeans ought to be available for improvement.

D. Correspondence Interface:

There are few correspondence interfaces required by the framework:

1. *Speech interface:*- So as to handle content to discourse.
2. *Camera interface*:- With a specific end goal to snatch characters for acknowledgment.

VII. CONCLUSION

In this work, the platform is provided to help the people to recognize unfamiliar Chinese characters with mobile devices. We collect the most complete data set of Chinese characters from the Internet, then create the images library of Chinese characters. After that, we build the feature library by extracting SIFT features from images library. The methods of SIFT keypoints filtering and SSC encoding are compatible for the limitation of mobile devices. We also apply high-dimensional indexing algorithm in recognition to improve the performance. Experiments show that the recognizer achieves great performance and shows smooth experience to users, but there is space for improvement. Some complicate Chinese characters can't be recognized correctly due to the instability of the phone camera and limited feature library. In the future, we will improve the application by applying some image preprocessing method to alleviate the influence of hands trembling.

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