

FINGER VEIN-TECH

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Abstract - Finger vein recognition technology is a new biometric technology, which has the characteristics of the living capture, stability, difficult to steal and imitation, etc. has a wide application space in the field of information security. This system helps to form a paperless and cardless payment services. The fingerprint recognition method has many malfunctions, it is more advanced and reliable technology like finger vein recognition can be used to overcome its drawbacks. The proposed systems make use of Convolutional Neural Network for image classification and recognition. The software part for matching and recognizing vein patterns has been implemented. The vein structure in one's each hand and each finger is also different. Thus images of veins are collected from both hands (all fingers) in various angles to get an effective results using CNN.

Key Words: CNN, finger veins

1. INTRODUCTION

The Biological characteristics of Human body such as Finger print, Finger vein and iris have uniqueness, stability and are difficult to imitate. Moreover, Finger vein recognition has more advantages, fast & lives recognition. The devices for capturing finger veins have high precision and low energy consumption. The performance of finger vein capturing device has great influence on the quality of vein images and the result of post process. It is necessary to design a simple vein capturing device with excellent quality. Either we can use a device with near IR or far IR for taking finger vein patterns. An acquisition based ARM and CMOS array design is used. The pattern is collected in different angles & the matching process is performed using software on the PC. The device are used to capture the images but, the matching process is performed using an efficient, error prone Algorithm. Here in this paper, we use CNN algorithm for matching procedure & compared to other, it is easy to implement & which make use of image classification & recognition.

2. METHOD

For the process of better, high and secure biometric authentication, we use Finger vein recognition. The Finger veins are being captured using a simple device with excellent quality. One among them is an acquisition based ARM and

CMOS array device which uses Near IR rays for capturing the vein patterns. Human finger or back of their palm s kept in the device, the vein patterns photographs are obtained in different angles. These images are given to PC in which, the software in the PC is responsible for the matching process.



Fig -1: Finger vein capturing device

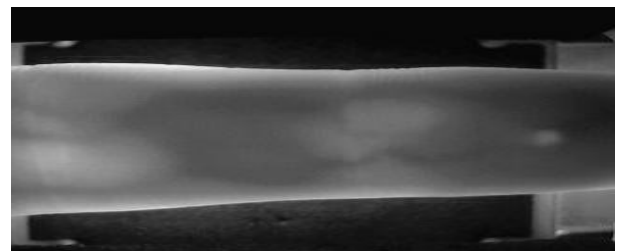


Fig -2: Finger vein pattern

In this paper, we use Convolutional Neural Network (CNN/ConvNet) which is a Deep Learning Algorithm that can take an input image, assign importance to various aspects/objects in the image and be able to differentiate one from the other. It is a neural network that has one or more Convolutional layers and is used for image processing, classification and segmentation and also for other auto correlated data. Among other layers we uses mainly three layers.

A. Inception Layer

It is used in CNN to allow for more efficient computation and deeper networks through a dimensionality reduction with stacked 1x1 convolutions. The modules were designed to solve the computational expense, as well as over fitting among other issues. The most simplified version of an inception module works by performing a convolution on an

input with not one, but three different sizes of filters (1x1, 3x3, and 5x5). Also max pooling is performed. The resulting output are concentrated and sent to the next layer. By structuring the CNN to perform its convolutions on the same level, the network gets progressively wider, not deeper.

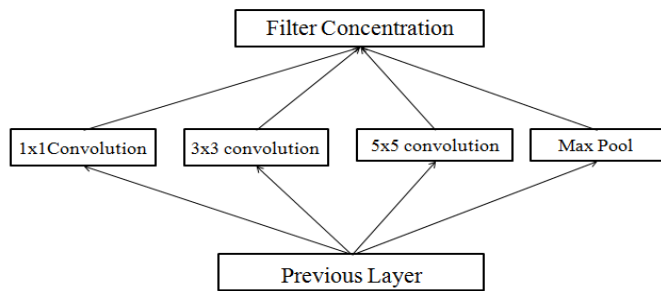


Fig -3: Inception module

To make the process less expensive, can add an extra 1x1 convolution before 3x3 and 5x5 layers. By doing so, the number of input channels is limited and 1x1 convolutions are far cheaper than 5x5 convolutions. It is added after max pooling layer.

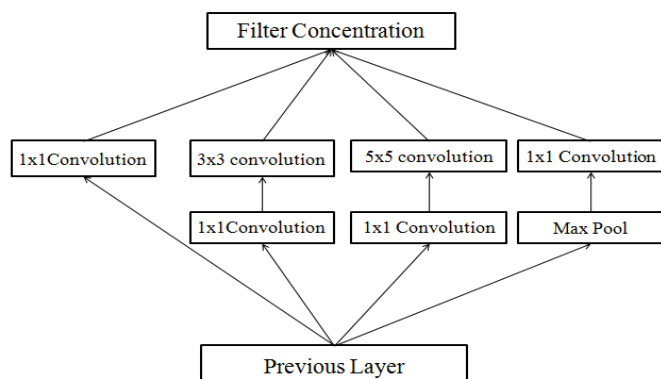


Fig -4: Inception module

B. Pooling Layer

A Pooling Layers is another building block of CNN.

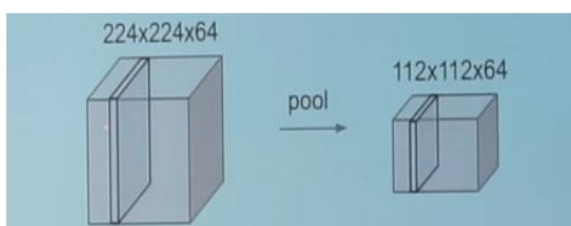


Fig -5: Pooling

Its function is to progressively reduce the spatial size of the representation to reduce the amount of parameters & computation in the network. It operates on each feature map independently. The most common approach used in pooling is max pooling.

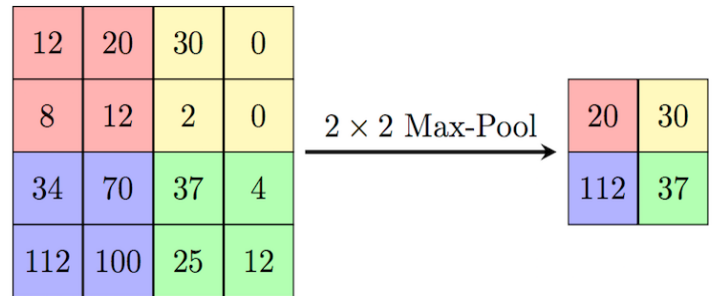


Fig -6: Max Pooling

Max pooling is a sample-based discretization process. The objective is to down-sample an input representation (image, hidden-layer output matrix, etc.), reducing its dimensionality and allowing for assumptions to be made about features contained in the sub-regions binned.

C. Bottleneck Layer

They are added to reduce the number of feature maps (channels) in the network. It is achieved by using 1x1 convolutions with less output channels than input. It is the last pre-processing phase before the actual training with data recognitions start. It is a phase where class is formed from each training image, that the final phase of training can take place and distinguish the image from every other image used in training material. The amount of training material may have to be compromised if this bottleneck seems too time consuming.

3. DESIGN OF SOFTWARE

Front End: PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python language. It is developed by the Czech company JetBrains. It provides code analysis, a graphical debugger, an integrated unit tester, integration with version control systems (VCSes), and supports web development with Django as well as Data Science with Anaconda. PyCharm is cross-platform, with Windows, macOS and Linux versions. The Community Edition is released under the Apache License, and there is also Professional Edition with extra features released under a proprietary license. We use PyCharm since it provide us- Coding assistance and analysis, with code completion, Project and

code navigation, Support for web frameworks, Integrated unit testing, with line-by-line code coverage, etc.

Back End: SQLyog is a GUI tool for the RDBMS MySQL. It is developed by Webyog, Inc., based in Bangalore, India, and Santa Clara, California. Nowadays SQLyog is distributed both as free software as well as several paid, proprietary, versions. The free software version is known as Community Edition. It provides Intelligent Code Completion, Visual Schema Designer, Visual Query Builder, Query Formatter etc.

Hardware Requirements:

Processor: Intel core i3 and after all.

RAM 2GB or Higher.

Monitor.

Keyboard.

Software Requirements:

Operating System: Windows 10

Database: SQLyog

REFERENCES

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4. CONCLUSIONS

The proposed system implements the software part used for matching the vein images for personal identification. Convolutional Neural Network is used to make image classification and recognition since it provide high accuracy. For better classification process, images with various angles are collected and trained. The input images are processed to match with the trained image to get the result.

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