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[Data Science]

HAND GESTURE RECOGNITION AND VIRTUAL MOUSE

Group No: 17

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PROJECT GUIDE : MAYA VARGHESE

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Contents

Introduction

- The development of user interfaces influences the changes in the Human-Computer Interaction (HCI).
- Human hand gestures have been a mode of non verbal interaction way before any languages were invented.
- This gesture recognition system uses image processing techniques for recognition of hand gestures for converting it to a meaningful mouse command.
- The model put forward here can be substantially applied towards different applications like controllers, image browser, games, sign language and many more which in general uses gesture recognition.

Problem Statement

HAND GESTURE RECOGNITION AND VIRTUAL MOUSE

- Hand gesture plays an important part in non verbal communication.
- They provide the user with a new form of interaction that mirrors their experience in the real world.
- Gesture recognition is especially valuable in applications involving interaction human/robot for several reasons.
- Consequently, this project is based on real-time detection of hand gestures and its application in mouse controlling.

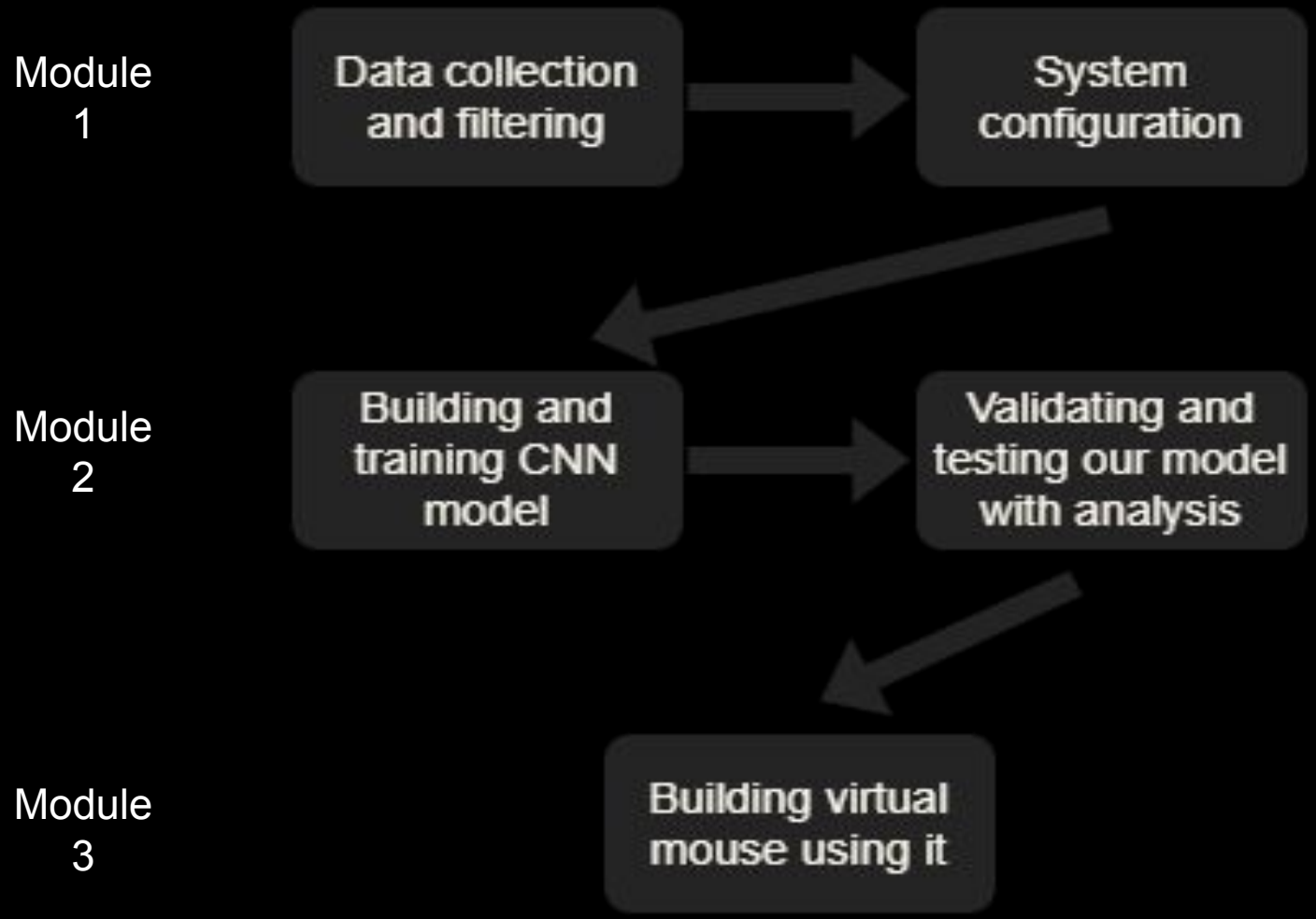
Proposed system

- Configured system to meet requirements of our project by installing dependencies and external hardware.
- Downloaded the dataset from the web and filtered it as per requirements.
- Trained a model using CNN to recognize different hand gestures and output to frame.
- Each gesture is trained by images of 64 by 64 pixels each. Model is then validated and tested.
- Model has achieved 99.24 % accuracy on testing data. Using this model, making a mouse controller which uses specific gestures for specific tasks respectively.

Literature Survey

Sr. No	Paper Title	Advantages	Disadvantages
1	Gesture Recognition of RGB and RGB-D Static Images Using Convolutional Neural Networks	2 stage freezing layers for tackling overfitting	It is static
2	Hand Gesture Recognition system for numbers using thresholding	Thresholding concept is applied	Colored glove is requisite
3	Convolutional network and its application in deep learning	Convolutional Neural network tries to learn good features in relatively small dataset	---

Process Design



Details of Hardware/Software used

SOFTWARE-

VS code

Python 3.5 and above

Dependencies_

- Opencv == 4.5.4.58 –– For real-time webcam functionality
- Numpy == 1.21.4 ––Data manipulation
- Tensorflow == 2.7.0 –– ML framework
- Keras == 2.7.0 –– ML framework running on top of TF

HARDWARE-

Intel core i5-2430M, 3.00GHz

Ram : 8 gigabytes

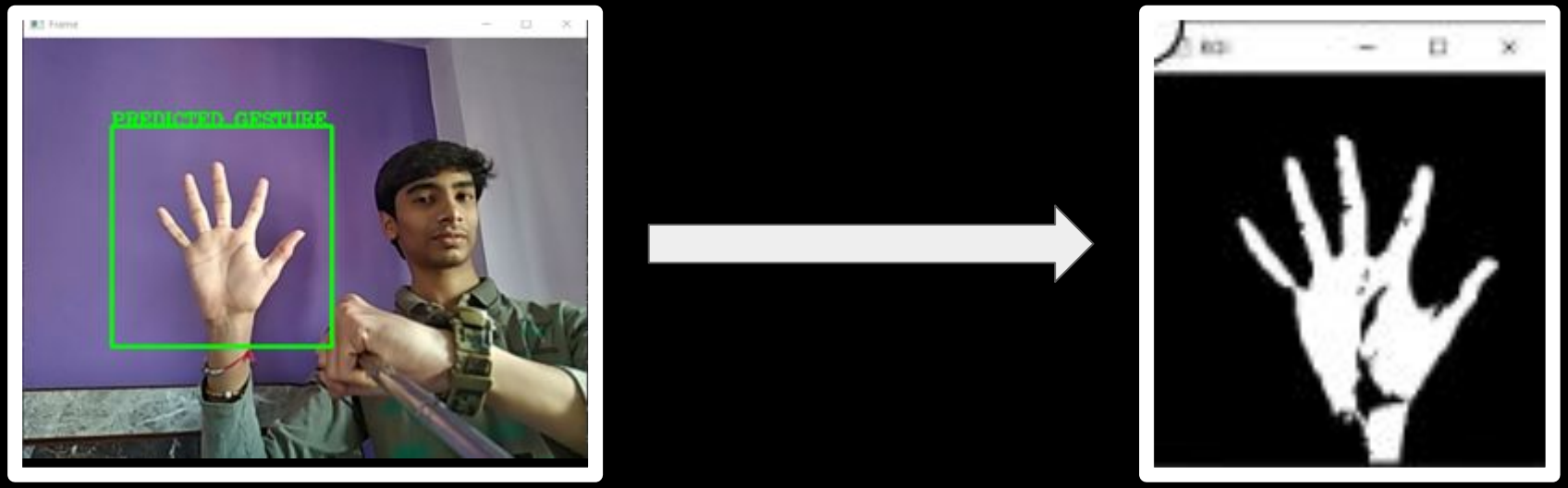
Webcam : 12 megapixel

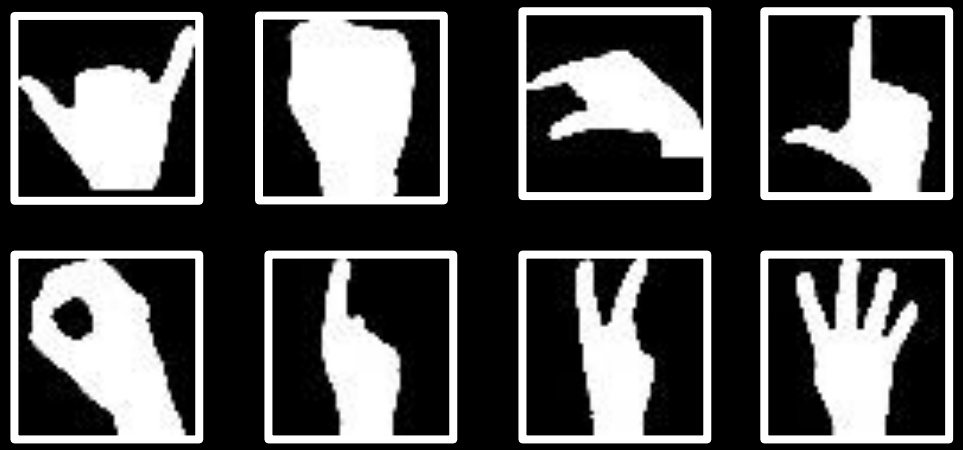
Graphic card : Intel integrated graphics

64 bit architecture operating system

Experiment and Result

Result_





64 by 64 images
from dataset
zoomed to get clear
idea

```
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]]
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]]
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```

Realtime hot encoded vector output

Conclusion and Future work

Conclusion_

- Making an accurate model which along with analyzed information , detects hand gestures with accuracy of 99.24% after validation, testing model on both images from the dataset and real-time webcam's captured feed

Future work_

- In the future, this architecture is expanded to "Virtual Mouse" which in real-time operates and performs specific tasks based on detected gestures. Each gesture will correspond to predefined functionality and the user then will be able to control their system's mouse using pre-trained gestures.

References

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Thank you

We sincerely appreciate your active listening