

## SKETCH CLASSIFICATION USING CNN TO HELP REDUCE LANGUAGE BARRIER

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**Abstract**— The main concept or idea behind the project is to create an application which enables you to track the hand movement, while you are drawing a sketch using a highlighted cursor in front of the camera and the machine learning model using CNN tries to configure the sketch and present you the image which is most significant to the pixels traced by the hand movement. This will not only help reducing the language barrier between people using different language as images are one of the best and efficient way to communicate, but also help people who are differently-abled to communicate effectively using sketch made by hand movement.

**Key words:** Convolutional Neural Network, sketch prediction, Image Classification, Real-World Applications, Deep Learning, Image Frame Analysis

### I. INTRODUCTION

Initially it was a game developed by Google named quick draw which eventually evolved with Machine learning algorithms to recognize sketch with more precision. Many other technologies or research followed the trend to use its application in various domains such as educative purpose of algorithms and could be implemented for small kids so that it can help them to learn to draw. Looking forward to the scope of its application we in this project have tried to make something which not only subset all its previous applications but also will be of great help in reducing language barrier

### II. MOTIVATION

With the development in Deep Learning we can make change or bring some change in our society with the help of technology. So do we have also tried to make some changes or tried to help people of certain societies like those who are differently abled and cannot communicate through common words can use the most ancient technique of communication which is communicating by making sketches. This project is also inspired to make changes for tourist who visits different parts of the world and does not share the common language between the local one and themselves so, they can communicate with each other by using normal means of sketching and transferring thoughts.



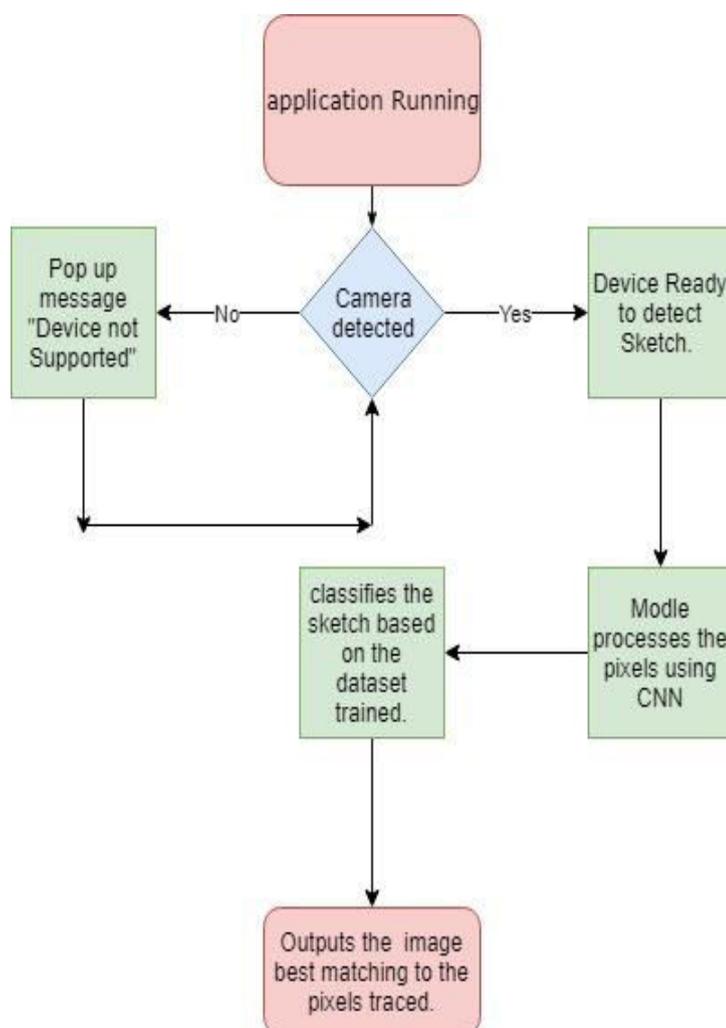
### III. LITERATURE SURVEY

Tsung-Han, Po-Ting Chi, Kuo-Hsing, Cheng [1] The concept given by them suggest or serve main purpose to create learning or sketching for children in an edutainment way but this included extra expense of embedding the screen to the system and other hardware component to the system.

Kristine Guo, James WoMa, Eric XU. [2] The approach was also based on CNN but due to un-extracted features it resulted in a low accuracy of 73%.

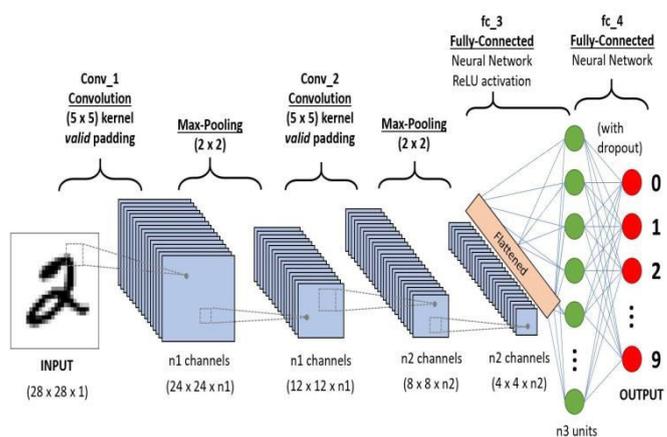
David Ha, Douglas Eck [3]. sketch-rnn is able to generate possible ways to finish an existing, but unfinished sketch drawing. This may result in ambiguity of result as user may want to draw a image of chocolate but at some point in the half way it matches some what to ice cream then it would result in wrong output.

### IV. PROGRAM FLOW



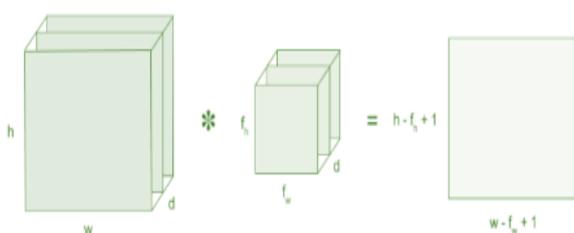
### V. DOMAIN AREA OF PROJECT

This project is based on CNN( Convolutional n Neural Network) which is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/characteristics .



### VI. MATHEMATICAL MODEL

- An image matrix (volume) of dimension  $(h \times w \times d)$
- A filter  $(f_h \times f_w \times d)$
- Outputs a volume dimension  $(h - f_h + 1) \times (w - f_w + 1) \times 1$



Consider a 5 x 5 whose image pixel values are 0, 1 and filter matrix 3 x 3 as shown in below

1	1	1	0	0
0	1	1	1	0
0	0	1	1	1
0	0	1	1	0
0	1	1	0	0



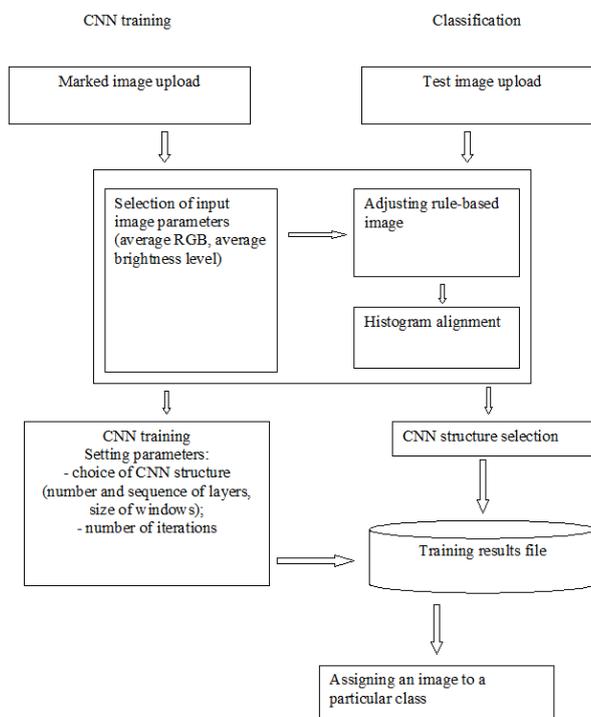
1	0	1
0	1	0
1	0	1

5 x 5 - Image Matrix

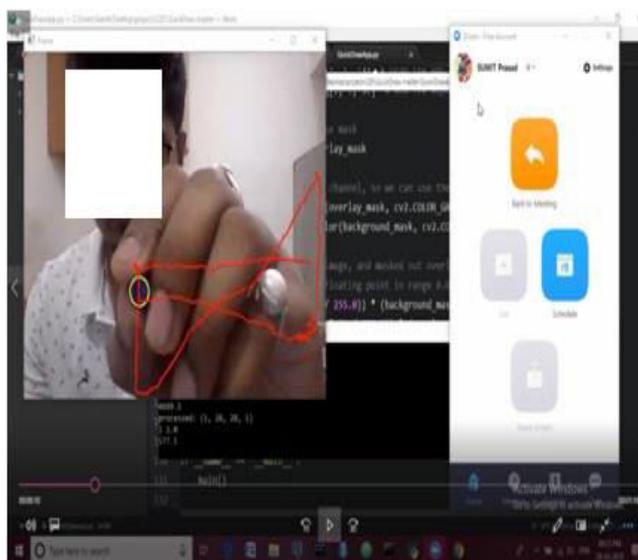
3 x 3 - Filter Matrix

### VII. SYSTEM IMPLEMENTATION PLANNING

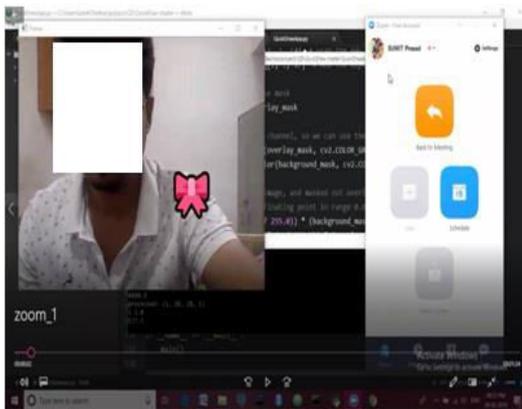
Purpose: To help differently abled people to communicate through the most ancient way of communication which is sketching and help tourist communicating with people of different region in different geographies of world which does not share the common language. It could also help small kids in learning sketching and identifying the objects which they have sketched it, would a fun way for the kids to learn sketching.



### VIII. FEASIBILITY STUDY

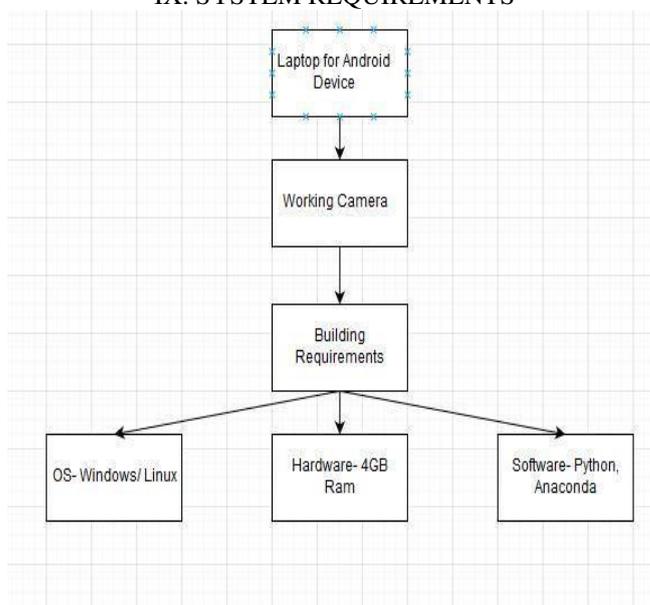


Input: A rough Sketch Drawn in-front of Camera



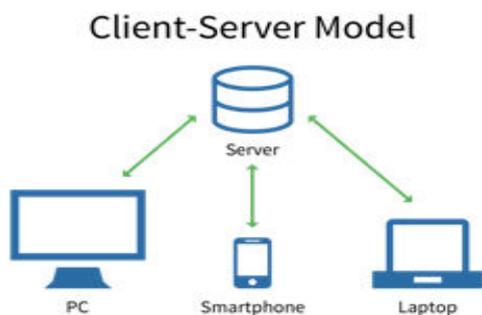
Output: It generates the image of the sketch

### IX. SYSTEM REQUIREMENTS



### X. SCOPE OF IMPLEMENTATION

Further Scope of Implementation: It can be made handy by bringing all implementation to a Mobile Device by deploying all computation to a server and creating a client-server architecture.



### XI. CONCLUSION

Sketch classification using Google Quick Draw Dataset and implementation using CNN can be done effectively to reduce the language barrier efficiently. Reference and source of motivation is Quick Draw project by Akshay Bhadur.

### XII. ACKNOWLEDGMENT

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### XIII. REFERENCES

- [1] Tsung-Han Tsai, Poting Chi, Kuo Hsing Cheng. A Sketch Classifier Technique with Deep Learning Models Realized in an Embedded System. In IEEE 2019
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