

Handwritten Alphabet Recognition System

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Problem & Objective:

Our project focuses on solving problems related to Optical Character Recognition by accurately identifying alphabets from pixel values of handwritten alphabet images.

K-Nearest Neighbor, Artificial Neural Network & Convolutional Neural Network algorithms are implemented on the image data.

Data Description:

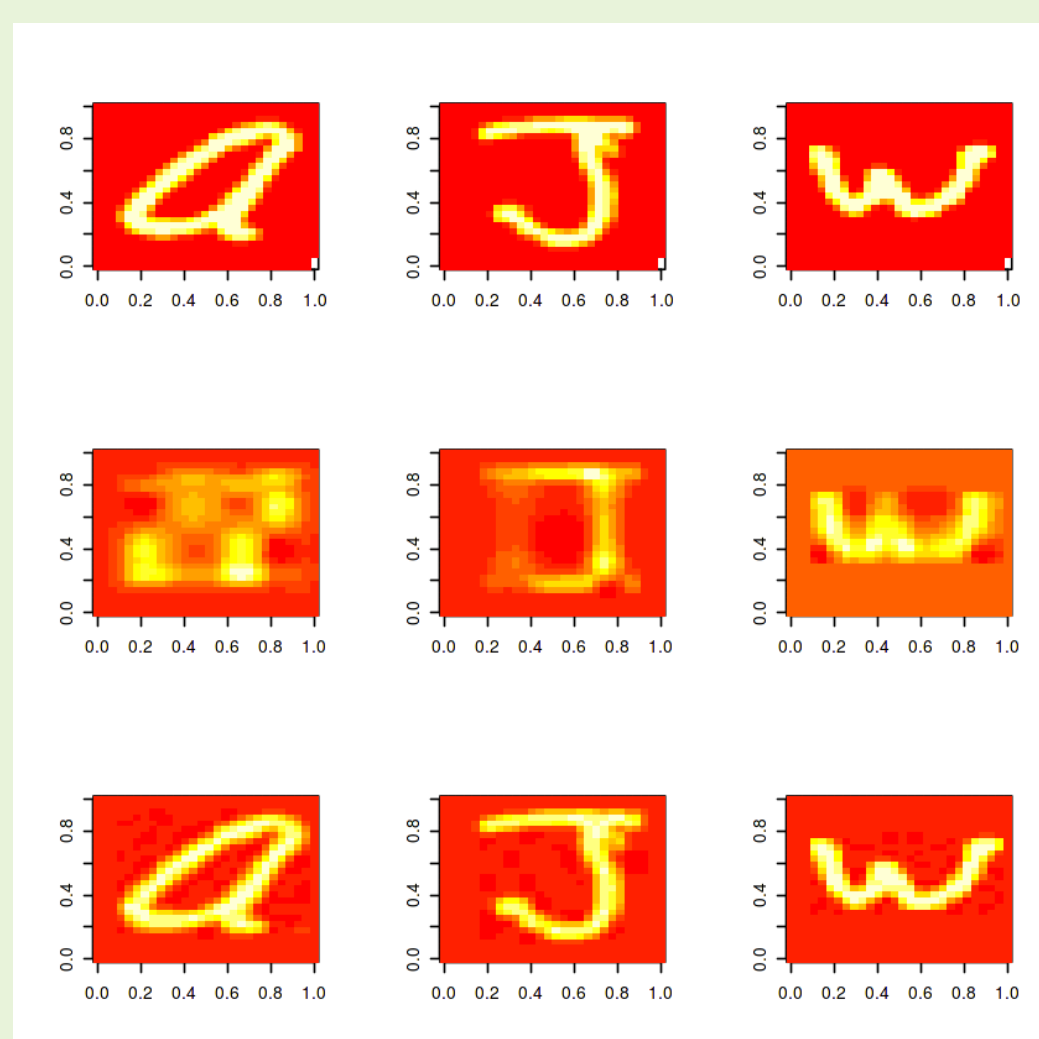
EMNIST is an extension of MNIST dataset. EMIST dataset consists of balanced set of English handwritten alphabet images.

EMNIST letter dataset contains mix of uppercase and lowercase alphabets. All alphabets are equally distributed.

The dataset is formed by
Train: 88799
Test: 14800
Total: 103600



Principal Component Analysis:

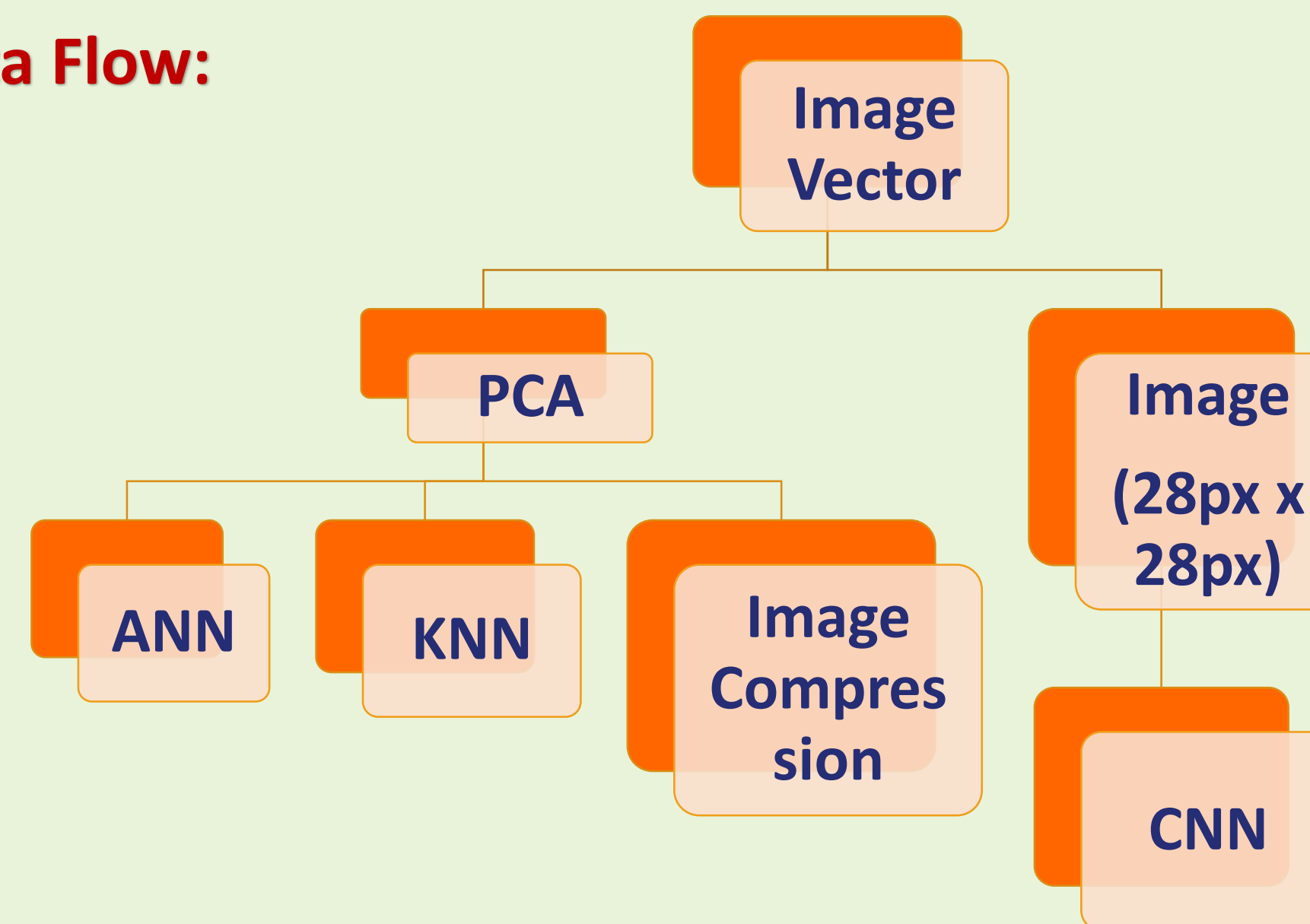


Original Image

Image with 2 Principal components

Image with 3 Principal components

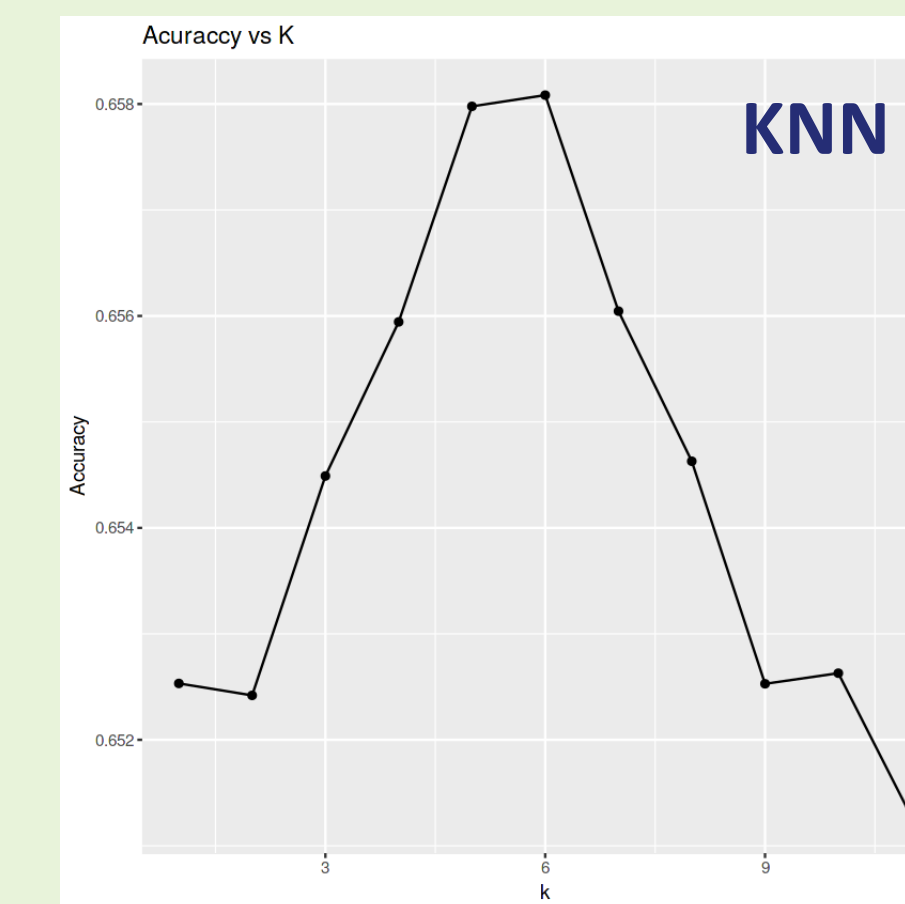
Data Flow:



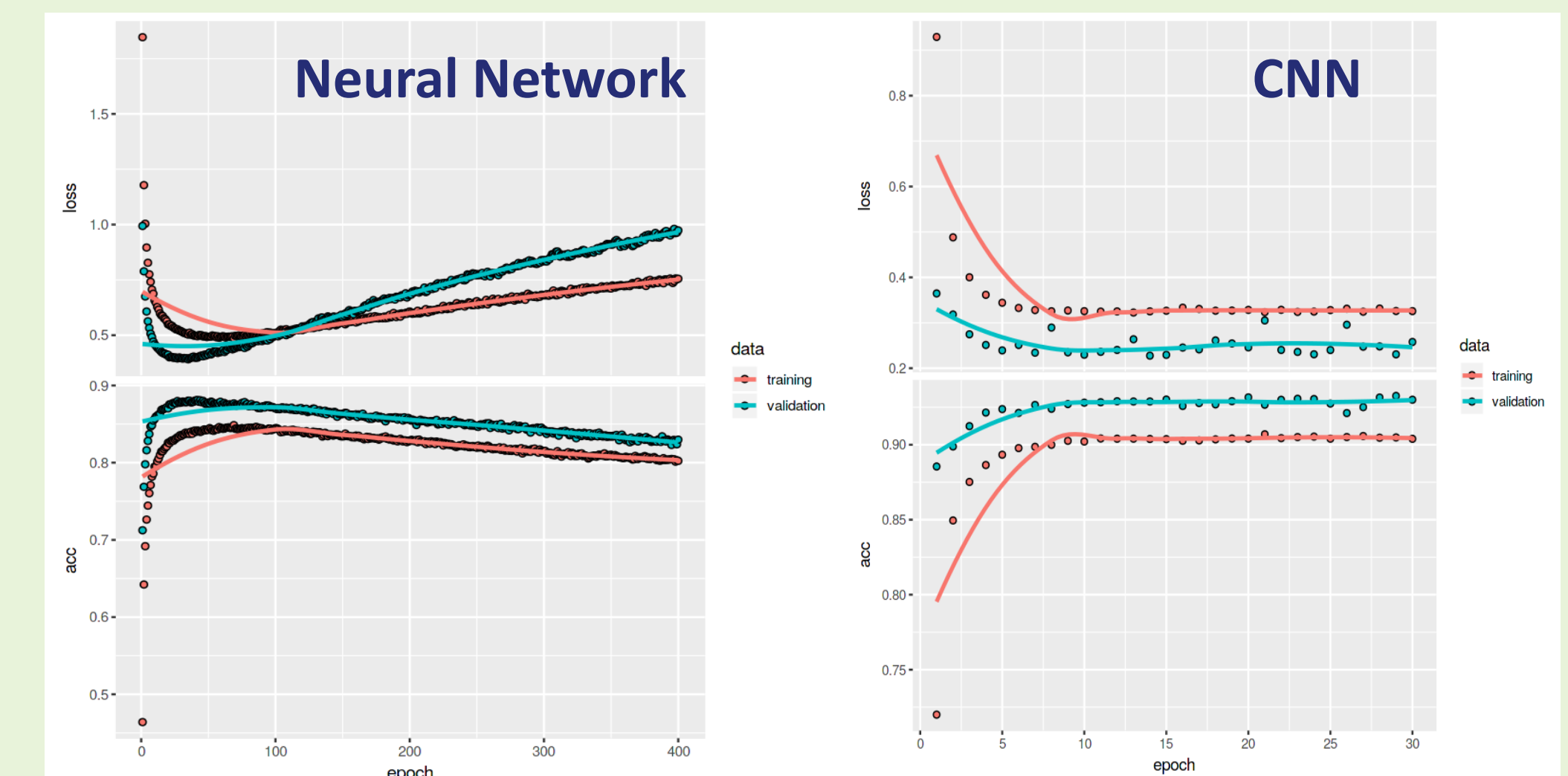
Model Description:

MODEL	DESCRIPTION	EVALUATION
K- Nearest Neighbor	Image Vector to top PCA loadings to KNN	Accuracy
Artificial Neural Network	Image Vector to top PCA loadings to Multilayer Perceptron (128 x 64 x 26 network)	Accuracy
Convolutional Neural Network	Image to CNN Convolution layer (32),Convolution layer (64) Max Pooling (2,2), Flatten, Dense (128), Dense (26)	Accuracy

Model Evaluation:



MODEL	ACCURACY
KNN	65.8 %
ANN	87.7 %
CNN	93.2 %



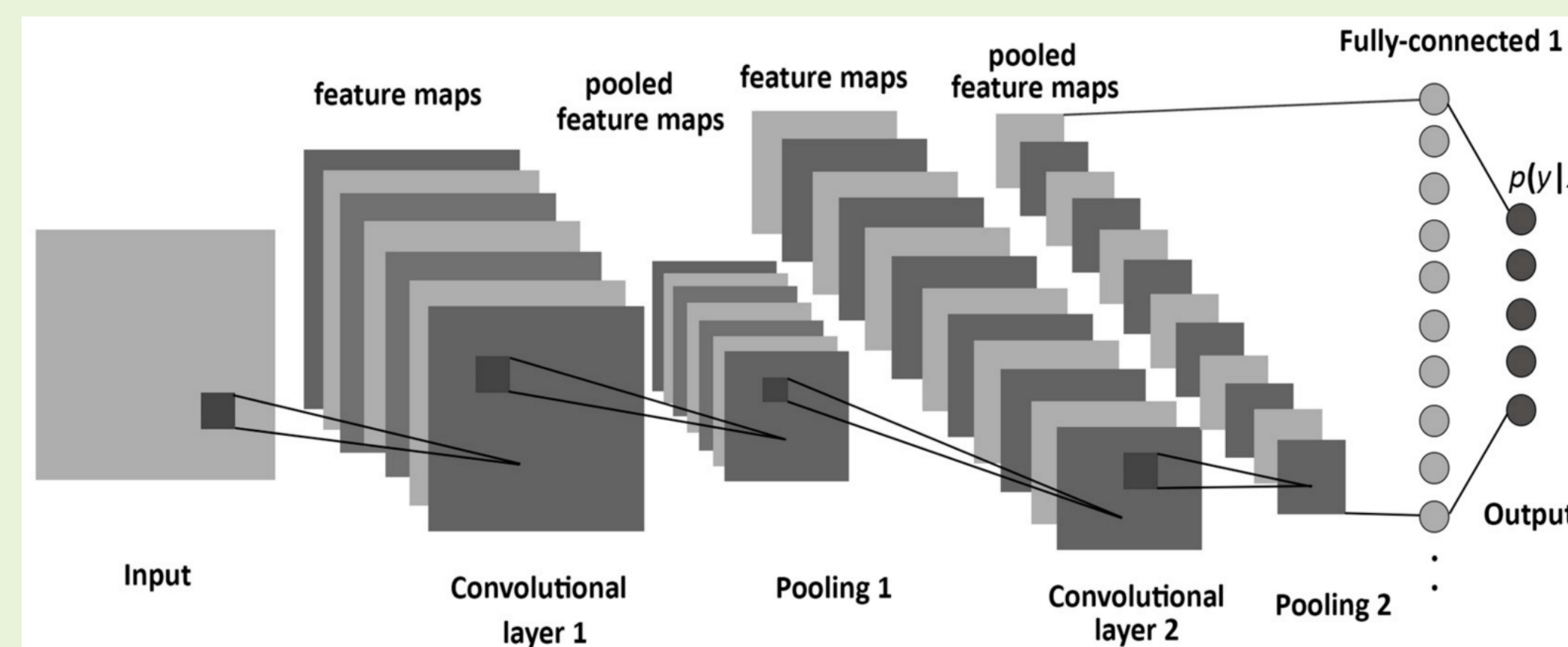
Conclusion:

By using the models such as the one used in this project Optical Character Recognition could be achieved to identify the handwritten alphabets.

Future works can explore other model techniques and also can tune hyper-parameters to attain better accuracy.

Data Source:

Dataset:
<https://www.kaggle.com/crawford/emnist>



Source: TowardsDataScience.com