# CNN MODEL FOR PREDICTING IMAGES

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*Abstract*—**In this paper, we discuss about making a CNN model for a fruits image dataset taken from Kaggle. The aim is to make a CNN model that can predict the class of images with high accuracy.**

*Keywords—CNN, Softmax, Cross-Entropy*

## I. INTRODUCTION

In deep learning, a convolutional neural network is a class of deep neural networks, mostly used for analysing visual imagery. A convolutional neural network is just an artificial neural network on which we use the convolutional trick to add some convolutional layers.

Here we use Softmax activation function and cross-entropy loss function to achieve maximum accuracy.

## II. SOFTMAX

Softmax function is a generalization of the logistic function. Softmax is applied through a neural network layer just before the output layer. The Softmax layer must have the same number of nodes as the output layer. The mathematical equation of the Softmax activation function is:

$$f_j(z) = \frac{e^{z_j}}{\sum_k e^{z_k}}$$

The softmax function squashes the outputs of each unit to be between 0 and 1, just like a sigmoid function. But it also divides each output such that the total sum of the outputs is equal to 1. The output of the softmax function is equivalent to a categorical probability distribution, it tells you the probability that any of the classes are true.

## III. CROSS-ENTROPY

A. Cross-entropy is a loss function that measures the performance of a classification model whose output is a probability value between 0 and 1. Cross-entropy loss increases as the predicted probability diverges from the actual label. So predicting a probability of .012 when the actual observation label is 1 would be bad and result in a high loss value. A perfect model would have a log loss of 0. The mathematical equation of cross-entropy is:

$$Cross\ Entropy = -\frac{1}{N}\sum_j y_j * \log(\hat{y}_j)$$

① true label * log(predicted)

② sum over all sequences in each batch

③ divide by the number of samples

## IV. METHODOLOGY

### A. Dataset

We collected the dataset of images from Kaggle.

### B. Importing Libraries

Imported the libraries:
Keras: An open-source neural-network library written in Python.

## V. EXPERIMENTAL RESUTS

We set the number of epochs equal to 7 and got an accuracy of 99.66%.

### REFERENCES

1. Kaibo Duan1, S. Sathiya Keerthi, Wei Chu1, Shirish Krishnaj Shevade, and Aun Neow Poo "Multi-Category Classification by Soft-Max Combination of Binary Classifiers".

2. Zhilu Zhang and Mert R. Sabuncu "Generalized Cross Entropy Loss for Training Deep Neural Networks with Noisy Labels"