CLASSIFYING IMAGES OF CLOTHING ML

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ABSTRACT

The primary goal of an image classifier is to classify images of clothing, such as shirts, sneakers, and so on, using algorithms for machine learning and a few Python libraries. This model can recognize images based on previously trained images and co-relate them to produce the best possible result. Classification is a type of data analysis that can be used to derive models that describe important data classes or to forecast future data trends. Image classification has recently become a popular and important aspect of the fashion industry and in other areas as well. Clothing image classification is the way to go from searching for your favorite shirt on the internet to discovering your fashion sense. The fashion industry relies on cloth image classification for a variety of applications. We'll be using the Fashion MNIST dataset, which contains 70,000 grayscale images divided into ten categories for our model.

1. INTRODUCTION

Machine Learning

Machine learning is the field of study that allows computers to learn without being explicitly programmed. Using machine learning, we do not need to provide explicit instructions to Computers for reacting to some special situations. We need to provide training on computers to find real-time solutions for specific problems. The chess game is a famous example where machine learning is being used to play chess. The code lets the machine learn and optimizes itself over repeated games. Machine learning is a growing technology which enables computers to learn automatically from past data. Machine learning uses various algorithms for building mathematical models and making predictions using historical data or information. Currently, it is being used for various tasks such as image recognition, speech recognition, email filtering, Facebook auto-tagging, recommender system, and many more.

Types of Machine Learning

Supervised Machine Learning

To train the supervised learning models, we use the labelled dataset. The model is tested by supplying a sample of test data after training and processing to see if it predicts the proper output.

Unsupervised Machine Learning

Unsupervised models can be trained using a dataset that has no classifications or categorizations and no labels, and the algorithm must act on that data without any supervision.

Reinforcement Learning

In reinforcement learning, an agent creates interactions with its surroundings and absorbs information from feedback.. The agent gets feedback in the form of rewards; for instance, he gets a good reward for every good action and a terrible reward for every bad action.

Some Popular Machine Learning Algorithms

Linear Regression:

Linear regression is one of the most popular and simple machine learning algorithms that is used for predictive analysis. Here, predictive analysis defines prediction of something, and linear regression makes predictions for continuous numbers such as salary, age, etc. It shows the linear relationship between the dependent and independent variables and shows how the dependent variable(y) changes according to the independent variable (x). It tries to best fit a line between the dependent and independent variables, and this best fit line is known as the regression line.

Logistic Regression:
Logistic regression is the supervised learning algorithm, which is used to predict categorical variables or discrete values. It can be used forthe classification problems inmachine learning, and the output of the logistic regression algorithm can be either Yesor NO, 0 or 1, Red or Blue, etc. Logistic regression is like the linear regression except how they are used, such as Linear regression is used to solve the regression problem and predict continuous values, whereas Logistic regression is used to solve theClassification problem and used to predict the discrete values.

Decision Tree Algorithm:
A decision tree is a supervised learning algorithm that is mainly used to solve classification problems but can also be used for solving regression problems. It can work with both categorical variables and continuous variables. It shows a tree-like structure that includes nodes and branches and starts with the root node that expands on further branches till the leaf node. The internal node is used to represent the features of the dataset, branches show the decision rules, and leaf nodes represent the outcome of the problem.

Deep Learning:
Deep learning is a subset of machine learning, which is essentially a neural network with three or more layers. These neural networks attempt to simulate the behavior of the human brain—albeit far from matching its ability—allowing it to "learn" from large amounts of data. While a neural network with a single layer can still make approximate predictions, additional hidden layers can help to optimize and refine for accuracy.

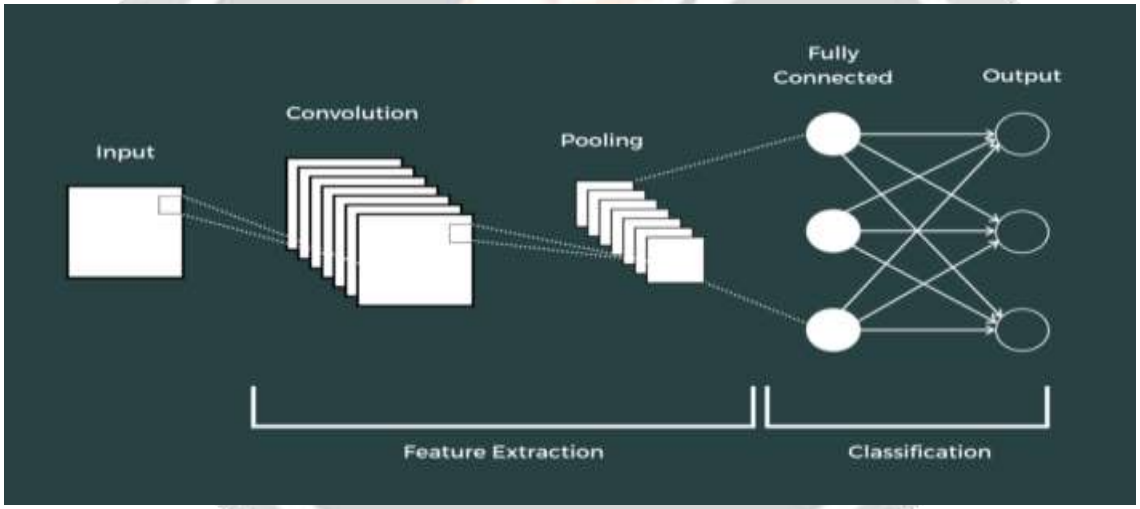

Fig-1*:* Machine Learning Block Diagram

2. METHODOLOGY

Data pre-processing in machine learning refers to the technique of preparing (cleaning and organizing) the raw data to make it suitable for building and training machine learning models. In our case, the pixels of greyscale images range from 0 to 255. As a result, in order to train the model, they must be converted to values between 0 and 1. Building the model requires configuring the layers , then compiling the model. The basic building block of the model is the layer. Layers extract representations from the data fed into them. Most of this consists of chaining together simple layers. Most layers have parameters that are learned during training. First layer of the model transforms the format of the images from two dimensional array to one dimensional array (unstacking rows of pixel). The second layer is the dense layer or fully connected layer . This layer returns a logit array with length of 10, each node contains a score that indicates the current image belongs to one of the ten classes.

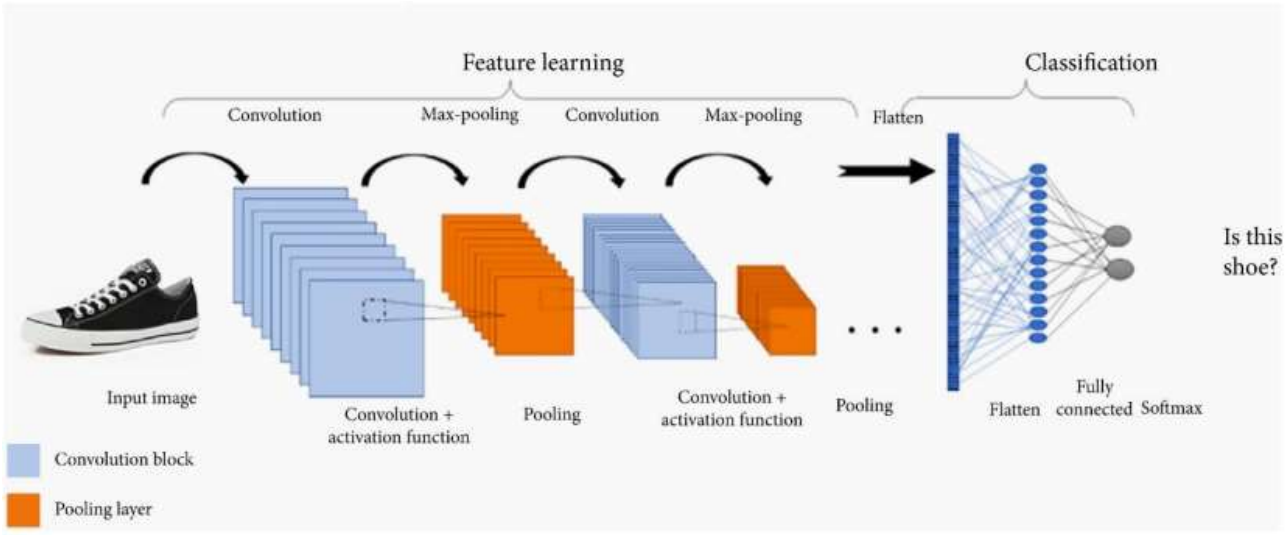

Fig-2*:* Proposed Architecture

3. RESULTS

```
def plot_image(i, predictions_array, true_label, img):
  true_label, img = true_label[i], img[i]
  plt.grid(False)
  plt.xticks([])
  plt.yticks([])

  plt.imshow(img, cmap=plt.cm.binary)

  predicted_label = np.argmax(predictions_array)
  if predicted_label == true_label:
    color = 'blue'
  else:
    color = 'red'

  plt.xlabel("{} {:2.0f}% ({})".format(class_names[predicted_label],
                                100*np.max(predictions_array),
                                class_names[true_label]),
                                color=color)

def plot_value_array(i, predictions_array, true_label):
  true_label = true_label[i]
  plt.grid(False)
  plt.xticks(range(10))
  plt.yticks([])
  thisplot = plt.bar(range(10), predictions_array, color="#777777")
  plt.ylim([0, 1])
  predicted_label = np.argmax(predictions_array)

  thisplot[predicted_label].set_color('red')
  thisplot[true_label].set_color('blue')
```

Fig 3: Screenshot 1

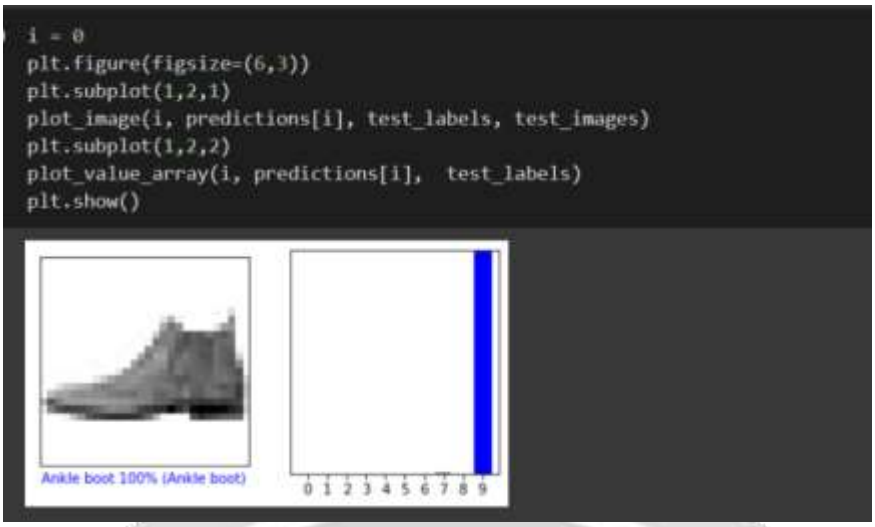

Fig 4: Screenshot 2

4. CONCLUSIONS

Obtained results evidence that classifying fashion products with CNN can be more accurate than by using other conventional machine learning models. In addition, it was observed that the dropout technique together with more convolutive layers are effective when it comes to reducing the bias of a model. Using TensorFlow 2 and GPU for training, we could reach not only a better training time, but also, better accuracies. Table shows the differences between our original work and the present.

5. REFERENCES

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