A MACHINE LEARNING APPROACH USING PYTHON TOOL

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Abstract

Artificial Intelligence, system gaining knowledge of and Deep learning are the buzzwords which have been clever to take hold of the interest of many researchers because numerous numbers of years. allow computers to think, make a choice and act like human beings has been one of the maximum considerable and noteworthy trends inside the area of pc science. diverse algorithms were designed over the years to make machines impersonate the human brain and many programming languages have been used to implement those algorithms. Python is one such programming language that offers a rich library of modules and applications to be used in clinical computing and device studying. This paper aims at exploring the primary standards related to system learning and attempts to implement a few of its applications the use of python. This paper majorly used Scikit-analyze library of Python for imposing the applications advanced for the reason of studies.

Keywords: Machine Learning, Python, AI, ML, Deep Learning

1. Introduction

Artificial Intelligence and Machine Learning and Deep Learning are the concepts that have been around for quite a few decades now and have been implemented or thought to be implemented many times, to make the machines do possibly everything that the humans can do without being explicitly instructed. For example, reading, deciding and marking an email as spam; or simply looking at the weather and deciding if an umbrella would be rquired when going out; or merely recognizing the features of a given fruit and identifying whether it is an apple or an orange.

Machine learning enables computers to find intuitive information by using algorithms that repeatedly learn from data instead of being explicitly programmed about where exactly to look for a piece of information.

1.   2. WHY MACHINE LEARNING

As pointed out by Brownlee (2015), Machine Learning facilitates the computers to program them. This very basic idea behind the concept of machine learning describes its importance in

today's computing.

Machine learning does the opposite by breaking this convention and working even if it isn't possible to pin down a mathematical principle, by repeatedly recognizing patterns and developing its own algorithms as and when the data changes. Prof. Mostafa further proved this by citing an example of predicting how a viewer would rate a movie, as there exists a pattern but it is not possible to pin down a mathematical model for the same because the way a person would rate a movie is not related to how they would rate other movies or how other people would rate the same movie.

3. Machine Learning Techniques

ML techniques are generally applied for discovering knowledge-based information and extracting features or recognizing patterns from large quantity of data. At present, majority of the researches are focusing on machine learning. Use of ML in WSNs may be seen with many improvements on traditional methods. Here we discussed some ML techniques that have been utilized as a part of WSN.[16]

3.1.1 Supervised Learning: The goal of supervised learning is to predict the worth of associate outcome live supported variety of input measures. The result measure may be numericalorcategorical.Learningisperformedonacollectionoftrainingsamples.Iftheresultiscategorical,the learning referred as classification problem. For a classification problem, we'd like to determine

   (a) what options to live and (b) what learning rule to use to maximize the training accuracy.

3.1.2 Semi-Supervised Learning: Semi-supervised learning, a category of supervised learning tasks and techniques that additionally build use of unlabeled data for training – usually a little quantity of labeled information with a large quantity of unlabeled information. Despite of employing only small volume of labeled data Semi-supervised learning has higher performance

3.1.3 Unsupervised Learning :Unsupervised learning accustomed draw inferences from datasets consisting of input data while not labeled responses. The foremost common unsupervised learning technique is cluster analysis that is employed for exploratory knowledge analysis to seek out hidden patterns or grouping in knowledge.

3.1.4 Reinforcement Learning: Reinforcement learning (RL) is one in all the intelligent algorithms. It deals with an environment in which an agent takes actions to achieve reward. The well known RL algorithm is Q-learning, assigns a Q-value to every agent which are frequently updated. Q-value of action at current state is defined as computation of total future reward.

3.1.5 Computational Intelligence Algorithms: Computational Intelligence (CI), the study of adjective mechanisms that modifier facilitate intelligent behavior in complicated and dynamical environments. These mechanisms embody paradigms that exhibit a capability to be told or adapt to new things, to generalize, abstract, discover and associate. CI is outlined because the process

representations and tools of intelligence able to be placing raw numerical sensory knowledge directly providing reliable and timely responses and withstanding high fault tolerance.
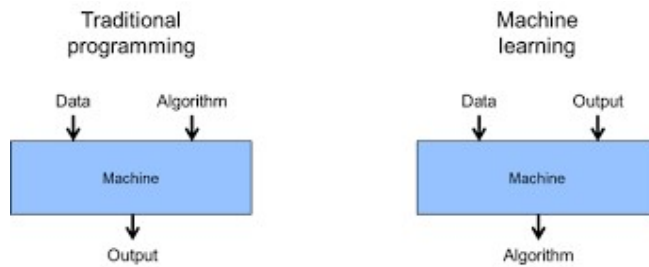
Fig.1 Traditional vs Machine Learning Programming

4. Tools used in Machine Learning

Tools makes machine learning swift and rapid. Machine learning tools provides interface to the machine learning programming language. They provide best practices for process and implementation [23]. Machine learning tools contains platforms which provides capabilities to run a module or project. Examples of platforms of machine learning are:

- Python SciPy subparts such as scikit-learn , Panda
- R Platform. • WEKA Machine Learning Workbench.
- Machine learning tools contains various libraries which provides all capabilities to complete a project and libraries provides various algorithms. Some of libraries are :
- JSAT in Java.
- Scikit-learn in Python.

2.   5. TYPES OF PROBLEMS SOLVED USING MACHINE LEARNING

☐   *Classification:* used to identify the category to which an object belongs. For example, is it spam? Or is it cancerous?

☐   *Regression:* used to predict a continuous numeric-valued aspect associated with an object. For example, the probability that a user would click on an ad or stock price prediction.

☐   *Similarity/ Anomaly:* used to retrieve similar objects or to find anomalies in behavior. For example, searching for similar images or detecting deception in user behavior.

☐   *Ranking:* used to sort relevant data according to a particular input. For example, Google Page Rank

☐   *Sequence Prediction:* used to predict the next element in a series of data. For example, predicting the next word in a sentence.

3.   6. MACHINE LEARNING WORKFLOW
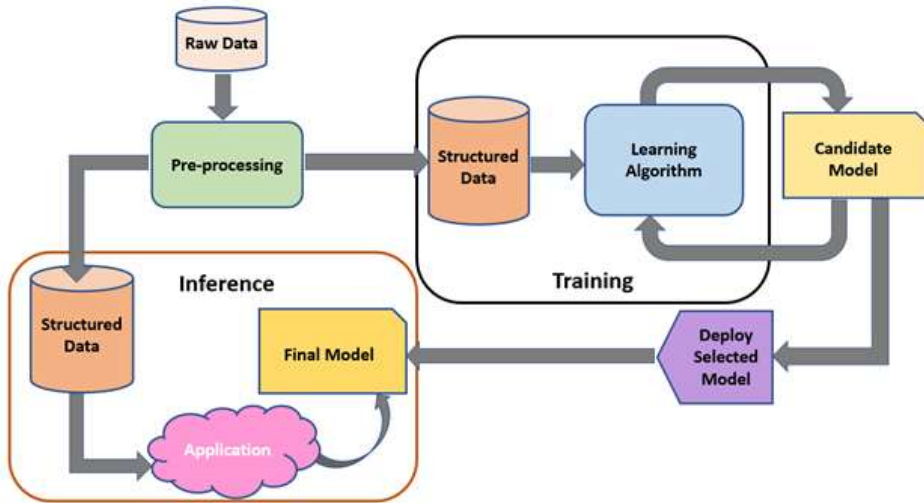
4. **FIG 2. MACHINE LEARNING WORKFLOW**

5. **7. WHY PYTHON**

In the current era Machine learning could also be easily implemented using other high level languages like MATLAB that provides a number of built-in features for performing matrix mathematics but it is not an open source language. Moving towards languages like Cand Java, matrix math libraries are available for them as well but it requires a lot of codeto perform simple things in these languages. These limitations have been overcome by python that is an open source, clean, brief and easy to read language with an availability of large number of libraries and packages makes python more popular in various domains including scientific and financial communities. Moreover, python does not require expert programming skills to catch up with its code, even non programmers could easily learn and code in python.

6. **8. MACHINE LEARNING APPROACH USING PYTHON**

A few basic applications of machine learning have been explored and implemented with respect to this research using python programming language. The names of the applications are as follows:

Spam Filter

Sentiment Analysis

Voice Chat-Bot

Image Classifier

Stock Market Prediction

9. Image Classifier

Implementation using Python Scikit-learn library was used for importing the required model. The labeled training data was manipulated, resized,reshaped and transposed using PIL and NumPy. This image data was then converted into an array using KERAS library. The model was trained over this data. In order to classify the image given by the user, it was first manipulated, resized, reshaped and transposed and converted to an array of same size as training data then further the category of given image was predicted by the model.

▪ Model Used: Multi-Layer Perceptron (MLP Classifier) from scikit-learn

▪ Code Snippet:

```
dpath= r'E:\Research\IC-18\cat-and-dog\training_set\dogs'cpath= r'E:\Research\IC-18\cat-and-dog\training_set\cats' def convert(path):
label = []ad = [] c=0
for file in os.listdir(path): label.append(file.split('.')[0])f=os.path.join(path,file)
im= Image.open(f)
im= im.convert(mode='RGB') imrs= im.resize((100,100)) imrs= img_to_array(imrs)/255
#imrs.transpose((2, 0, 3, 1)).reshape(4,4)imrs= imrs.reshape(100*100*3) ad.append(imrs)
c+=1
print("done") return ad,label

mlp= MLPClassifier (activation= 'logistic', solver= 'sgd')cat_data,cat_label = convert(cpath)
dog_data,dog_label = convert(dpath)
main_data = cat_data+dog_data  main_label = cat_label+dog_label  main_data = np.asarray(main_data) main_label = np.asarray(main_label)
main_label= main_label.reshape(len(main_label), -1)print(main_data.shape)
print("started") mlp.fit(main_data, main_label)
t_data = []
t = r'E:\Research\IC-18\cat-and-dog\test_set\cats\cat.4001.jpg'te = Image.open(t)
tes = te.convert(mode="RGB")test = tes.resize((100,100)) test = img_to_array(test)/255ta = test
testa = test.reshape(3*100*100)t_data.append(testa)

t_data = np.asarray(t_data)pred= mlp.predict(t_data) image = mpimg.imread(t) print(pred)
tr= ("classified as: {}". format(str(pred[0])))plt.text (15, 35, tr, fontsize=15) plt.imshow(image) plt.show()
```
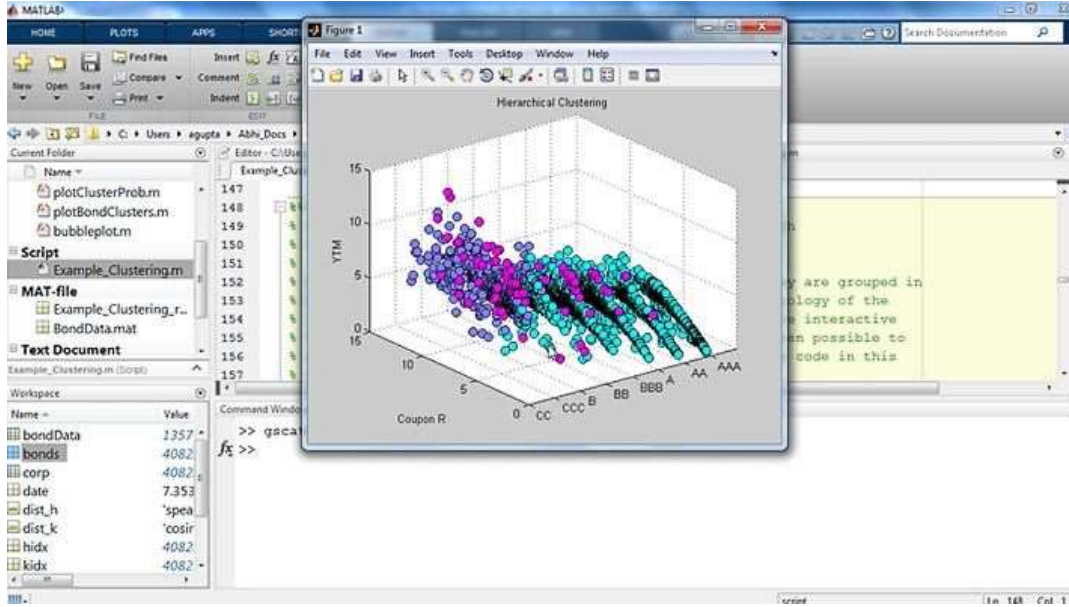
▪ Results:

▪ Interpretation: The dataset containing around 8000 images of cats and dogs was used to train the image classifier model and for testing a separate dataset was used containing approximately 2000 images of cats and dogs. The model was executed three times during testing with different image paths. The results show that the model was fairly able to recognize cats and dogs separately. If the size of dataset was reduced, as an experiment by the researchers, the accuracy of the model was affected in a negative way.

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