

AN INNOVATIVE APPROACH OF AI AND DEEP LEARNING USING PYTHON IMPLEMENTATION

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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: Deep Learning, Python, AI, Voice Chat Bot

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 required 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.

2. HISTORICAL TRENDS IN DEEP LEARNING

It is easiest to understand deep learning with some historical context. Rather than providing a detailed history of deep learning, we identify a few key trends: Deep learning has had a long and rich history, but has gone by many names reflecting different philosophical viewpoints, and has waxed and waned in popularity. Deep learning has become more useful as the amount of available training data has increased. Deep learning models have grown in size over time as computer hardware and software infrastructure for deep learning has improved. Deep learning has solved increasingly complicated applications with increasing accuracy over time.

3. Difference between Machine Learning and Deep 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.[8]

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 numerical or categorical. Learning is performed on a collection of training samples. If the result is categorical, 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 adaptto 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.

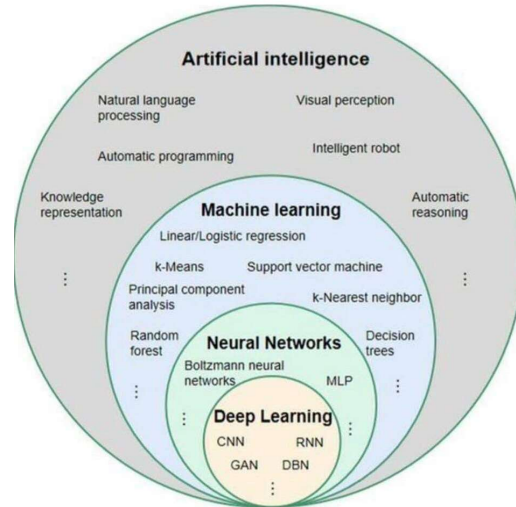


Fig.1 Differences Deep Learning vs Machine Learning

4. Tools used in Deep Learning

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

- **H2O.ai.**
- **TensorFlow.**
- **Keras.**
- **Caffe.**
- **DeepLearningKit.**
- **Torch.**
- **Theano.**

5. TYPES OF PROBLEMS SOLVED USING DEEP 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.

6. DEEP LEARNING WORKFLOW

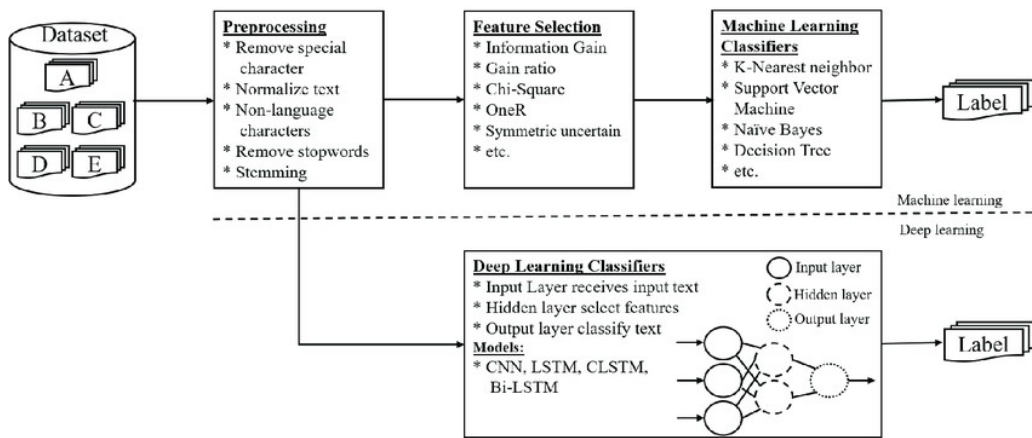


Fig 2. Deep Learning Workflow

7. WHY PYTHON

In the current era Deep 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 C and Java, matrix math libraries are available for them as well but it requires a lot of code to 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.

8. DEEP LEARNING APPROACH USING PYTHON IMPLEMENTATION

A few basic applications of Deep learning have been explored and implemented with respect to this research using python programming language.

Voice Chat-Bot

- A machine learning application built in python for interacting with an AI.
- As the name suggests, this application is used for voice chatting with an AI bot.
- A more advanced version of this application is currently being used by Google as Google Assistant, by Microsoft as Cortana, by Apple as Siri and by Amazon as Alexa.
- Implementation using Python? Chatterbot library was used for importing the model required, speech recognition API by Google was used for recognizing the user's voice, pyttsx was used to convert text to speech. The model was trained over the data provided by word-net from NLTK. Speech recognizer and microphone was made active by writing a line of code along with setting the output voice property. Then a voice input was provided by the user and the model responded to it accordingly.
- Model Used: Chatbot from chatterbot
- Code Snippet:

9. Voice Chat-Bot Implementation in Python

```

import pyttsx
import speech_recognition
as sr from chatterbot import
ChatBot chatbot =
ChatBot('Ron Obvious',
trainer='chatterbot.trainers.ChatterBotCorpusTrainer')
chatbot.train("chatterbot.corpus.english")
r =
sr.Recognizer
() m =
sr.Microphon
e()e=
pyttsx.init()
voices
=e.getProperty('voices')
e.setProperty
('voice',voices[1])def
my_form ():
try:
print ("A moment of silence, please...")
with m as source: r.adjust_for_ambient_noise(source)
print ("Set minimum energy threshold to {}".
format(r.energy_thresh

```

```

old))
r.energy_threshold=
400 for i in range
(10):
    print ("Say something!")
    r.dynamic_energy_threshold = False
    with m as source: audio =
    r.listen(source)print ("Got it! Now to
    recognize it.")
    try:
        #recognize speech using Google Speech
        Recognitionvalue = r.recognize_google(audio)
        x=str(valu
        e) print
        ("User: ",
        x)
        pp=chatbot.get_respons
        e(x)print ("Bot: ", pp)
        e.say(pp
        )
        e.runAn
        dWait()
    except:
        print ("sorry")
    except
    KeyboardInterrupt:
        pass
if __name__ == "
__main__":
    my_form ()

```

- Results:

```

A moment of silence, please...
Set minimum energy threshold to 407.12393085101485
Say something!
Got it! Now to recognize it..
User: it's getting late in the evening
Bot: That's not a very nice thing to say.
Say something!
Got it! Now to recognize it..
sorry
Say something!
Got it! Now to recognize it..
User: I am very tired
Bot: Why?
Say something!
Got it! Now to recognize it..
User: because I had to work for late
Bot: me working harder is an oxymoron.
Say something!
Got it! Now to recognize it..
sorry
Say something!
Got it! Now to recognize it..
sorry
Say something!
Got it! Now to recognize it..
User: don't say sorry
Bot: People worry about things all the time.
Say something!
Got it! Now to recognize it..
    
```

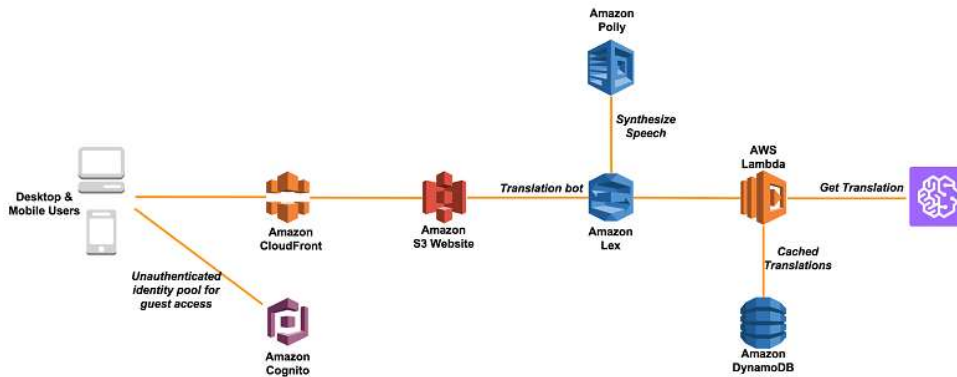


Fig 3 Voice Chat Box Synchronization

Interpretation: The chat bot was trained on a complete corpus of dialog data in English language and then users could converse with it just like any other human being. The bot was able to recognize the words being said to it and respond accordingly as visible in the output screen.

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