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Competence of Imitation Brain: A Study of Reasoning Power of Computer and an Analytical Study of Sentimentalities of Human's Emotions using Python

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***Abstract*—We humans are creative and the innovative nature of ours shows nothing but our intellectual ability. And if we want our appliances having same intellectual ability as us then it is called AI (artificial intelligence). Now-a-days AI has been assimilated with all the technologies i.e., it has even in our wrist watches also and this technology is in all demand and intensifying rapidly. It is used in every field and there they are used to foretelling everything from our test in music to our fitness for a job or in medical field or an educational opportunity and everything.**

***Index Terms*—Artificial Intelligence, Artificial Neural Network, Natural Language Processing**

I. INTRODUCTION

What could be an approach to make a computer, a machine, or an appliance to think like how smartly human thinks?? Isn't it something likes suitable for this trendy world?? YES, you got it right!! It is nothing but the studies of how human brains think, learn, decide, try to solve problems etc. This approach targets to improve a machine's functionality which are related to human knowledge i.e., learning, problem-solving and find solutions of complex problems as we humans act, and that approach is called Artificial Intelligence. "It is a discipline to make assessment by taking some inputs from the outer world like voice, image, input data etc." If we look at the words separately.

Artificial, simply means "not natural" or "man-made". Artificial something is meant to be fabricated by human beings and not manufactured by nature.

Intelligence insinuates to the competence to solve puzzles or some complex troubles/problems or create a proficient approach to solve any query whether it is related to computational or any other.

The focal goal of AI is to formulate the machine in such a means so that it could be able enough to accomplish such task which can be done by human intelligence like translate one language into another language, aptitude-based games & tasks, some mathematical theorems, recognize things etc.

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It is intangible. It is related to the intelligence, so we are able to also pronounce that it is thoroughly related to the study of our intelligence only. AI models trained based on the records provided to it and then it creates new instances from the knowledge gained and produces the solution in a time limit and with the limited resources provided. It imitates human intelligence and solves knowledge-rigorous tasks. It is vast and required in almost each field of today's world. Artificial Intelligence is an amalgamation of understanding, wisdom, analysis, problem-solving, perception, statistics etc.

AI is composed of:

- Reasoning
- Learning
- Problem Solving
- Perception
- Linguistic Intelligence

There are a lot of applications of AI in different fields, for instance in speech recognition, robots, gaming, Natural language processing, vision systems etc.

AI also includes autonomous vehicles like Self-Driving Cars, providing Mathematical Theorems, spam filtering, Recognition of image from photographs, Prediction of judicial decisions, Healthcare, Automotive, Finance, Video games etc.

Foremost target areas of this approach are Machine Learning, Computer Vision, Robotics, Natural Language Processing, Recognition, Vision, Healthcare, Cyber security, Automation etc.

Types of Artifical Intelligance

1. Type 1

1.1. **Strong AI:** A strong AI has complex algorithms and by using these algorithms, model do activities in a very confined manner just like human beings. The models/machines can do tasks very efficiently because they can think like humans. It is another level of Artificial Intelligence. It develops human-like consciousness without simulating it. Strong AI can also be named as True Intelligence.

1.2. Weak AI: Weak AI is also known as Narrow AI because it is not advanced as Strong AI. It is simulation of human cognitive function, but it

cannot be as conscious as humans and unlike Strong AI. Siri, self-driving cars are examples of weak AI.

2. Type:2

Following are the type-2 AI machines along with their separation facts to each other-

Reactive Machines*:* This is the very basic form of AI. It does not have memory to store historical data and take future decisions because it does not hold up the concept of the past. These types of Artificial Intelligence performing only on the things what it sees. This is not able sufficiently so that it could participate in the world interactively. Meanwhile, it is only limited specified and does not have any computerized imaginary concept, which we think it should be. It could perform basic acts but not highly thought-provoking acts that a today's modern world sees it.

Limited Memory*:* It has temporary memory that stores some past data (information) and by making those historical data as base and do future actions. But as mentioned that it is not permanent. It does not train in first time experience or data but after a time when it trained again and again with-it past data.

Theory of Mind*:* It can comprehend the human's sensation and contemplation. Or we can say that it could read the human mind, hence known to *Theory of Mind*. This kind of models has not been completed yet but by doing lots of improvements in the field, can be achieved. These machines can do tasks like they can read human mind i.e., these are able enough so that they can even understand the emotions of a human.

Self-awareness: These types of AI can be called as an addition to Theory of Mind category because these AI's are totally akin to a human in its performance. These are super advanced types of Artificial Intelligence and can be called as a complete human. Although this type does not exist in today's world, but researchers are working on it. And if once it achieved this will be a new era of AI field. If this AI mode is achieved, then this could be a tool to understand the human intelligence on its own tactic.

II. Artificial Intelligence ALGORITHMS

Regression Algorithm –

The regression model is an approach which allows us to estimate the linear relationship between two or more than two variables. It describes the change happened in one variable with respect to another variable (or variables). In regression, two variables are discussed. One is labeled as independent variable, while other is named as dependent variable. The independent variable may cause change in the dependent variable. For a case, if we want to calculate the annual sale of a corporation then, factors like employ, products percentage etc. will be considered as independent variables and but annual sale (we want to find) will be taken as dependent variables. Annual Sale (dependent variable) will be directly relying on independent variables. Relation between these two variables can be instituted using method called Regression. Both independent & dependent variables should be continuous in nature. The independent variable is tagged the *X* variable and the dependent variable is *Y* variable. The regression method aimed to find the straight-line correlation between the two variables by plotting a graph chart, variable X along with the horizontal axis while Y, the dependent variable along with the vertical axis.

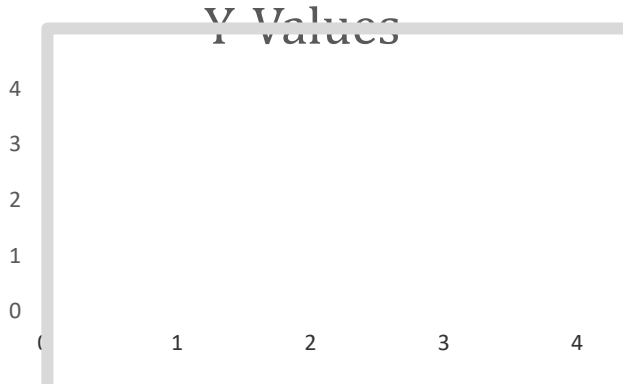

Fig.1: Regression Algorithm Relation

Above graph can be stated as follows:

$Y = c + bX$ (if there is only one independent variable)

Where, Y=dependent variable

c=intercept

b=slope

X=independent variable

In case whether there is more than one independent factors.

$Y = c + aX\hat{}2 + Bx$

1. Clustering:

Clustering is a group of objects/figures in such a way so that those objects must be analogous to other ones of that group and must be disparate to the entity of other groups. It aimed to discover the groups for the specified data set and want to make group or clusters of them based on defined relationships of given objects(data). We just make group of homogeneous type of figures. It has been used widely in marketing to attain more and more profit. For example, it makes clusters of same type of products which can provide users a convenient way along with the profit for the retailers as well.

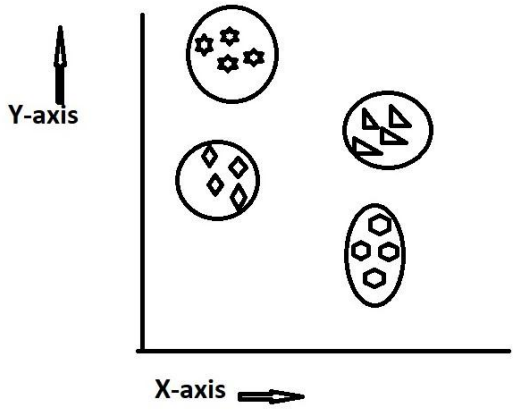

Fig. 2: Clustering

In above graph there are four groups of different shapes, or we can say that there are four clusters in above drawn graph. Although there are many clustering algorithms like K-means clustering, Mean-Shift clustering, Density-based clustering,

Expectation-maximization clustering, Agglomerative Hierarchical clustering etc. but K-means clustering is the recognized clustering algorithm, and it is popular in data mining and machine learning.

2. K-means:

Here, K denotes number of centroids and using those centroids data points to the nearest (adjacent) cluster. And 'means' stands for the means/average of the given data (for which centroid to be finding). This clustering method groups them into clusters of similar data and the numbers of groups are 'K'.

But the most critical part in this clustering is to find the value of 'K' because its value will directly affect our model and its performance and wrong value may causes the decrement of accurateness of model.

Two methods are there for finding 'K' value-

1. Elbow Method

2. Silhouette Method

3. Neural Network:

Neurons are the essential portion of human brain, which connects our body to brain. Its main utility is to send signals from body to brain to response for stimuli. And the concept of neural networks in artificial intelligence is encouraged by biological neurons. Neural Network is a model grounded on human brain and human nervous system. Main purpose is to make machine able enough, so that they can impersonate the functioning of a human intelligence because we humans are fortunate to having power of making decisions, power of adaptively, power of understanding situations and reach to the conclusion and so on but for doing such things we have to train the machine. Computers can do multifarious complicated and mathematical calculations rapidly but cannot make decisions and does not have adaptively, to make systems able to take decisions and various intellectual tasks, we must train them. Neurons acts like a shift (containing some data) between input and output point, neurons become dynamic after getting stimuli.

Artificial Neuron - As in biological neural network, single neuron cell is the elementary thing likewise in artificial neural network, artificial neuron is the basic building block. And a complete neural network can be obtained by combining two or more than two neurons. This artificial neural network contains following layers: -

1. Input layer
2. Output layer
3. Hidden layer

The input layer is connected to hidden layer and then hidden layer is connected to the output layer. The way in which these artificial neurons are connected to each other, called as topology. Single neuron is stated as "Perceptron (nodes)"and each node contains an activation function. The very first job is to create structure of the artificial neural network and when our model is ready it is trained against different cases and even for training; we have total two methods- supervised learning method and unsupervised learning method. Supervised learning is where the model is trained by providing input data manually while on the other side, in unsupervised learning model must make logic of given inputs without any manual support.

III. NATURAL LANGUAGE PROCESSING

Natural Language Processing is mainly abbreviated as NLP. Natural languages are those, which generally we humans speak. It is a sub-ground of Artificial Intelligence and basically used in human computer interaction. It is purposefulness to let computers understand our language, make machines to analyze the natural language and to increase the interaction between humans and computers. It is directly correlated to the development of the artificial intelligence because it takes natural languages, natural data, information; files etc. as an input and learn from those, hence increase the automation performance of the model. It is used in many fields i.e., social media, audio, video, market research, competitive analysis, sentiment analysis, advertising, healthcare, data mining and many more.
For example, it can be used in social media platforms for filtering inappropriate words by sentiment analysis.
There are different phases of NLP from which the process must go.

Following is the description of those phases: -

A. Lexical analysis
B. Syntax analysis
C. Semantic analysis
D. Discourse integration
E. Pragmatic analysis

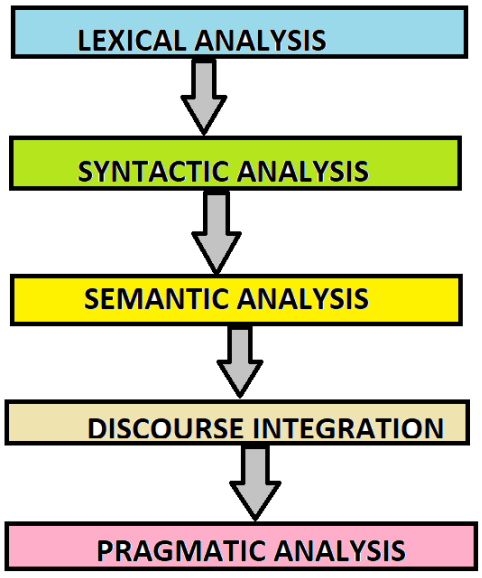

Fig. 3 Natural Language Processing Phases

Lexical Analysis: Lexical analysis is the very first phase of Natural Language processing. This phase includes the scanning part of source code & converts it into significant lexemes.

Syntactic Analysis: Next phase of NLP is syntactical analysis, which task is to check grammar, relations between words etc. This phase is also known as PARSING phase.

Semantic Analysis: And now comes Syntactic analysis in the NLP phases, which checks if the given statement is compositionally correct or not. It means, job of the syntactic analysis phase is to do if statement/statements is/are meaningful or not. We can simply say this is a route to grabbing meaning from the text. This analysis lets models to interpret the whole typescript and pinpointing the connection between words and grammatical structure etc. Semantic analyzer does flow control checking, type checking, label checking etc.

Text Extractor is the technique which draws out précised figures from the text.

Discourse Integration: Discourse integration simply means "a sagacity of the context". In simple words, it means that one sentence will depend on the others, e.g. "I want that book". In this sentence "that" word is dependent on the other sentence.

Pragmatic Analysis: This is the closing phase of Natural Language Processing. It ascertains projected effects through putting on a set of rules that categorized accommodating dialogs.

For example, "Give me a pen." is inferred as a request instead of a direction.

IV. IMPLEMENTATION OF SEMANTIC ANALYSIS USING PYTHON

```
>>> neg=
['2-faced','2-faces','abnormal','abolish','abominate'……,'
zealously', 'zombie']
>>> pos= ['a+', 'abound', 'astonishing',
'abundance',……..……,'zeal', 'zenith', 'zest', 'zippy']
>>> Text=input ("Please Enter Text").lower ()
>>> not_word=["-", ":", ";", "!", "@", "#", "$", "%", "^", "&",
"*", "(", ")", "=", "+", "`", "~", "/", "\\", "{", "}", "[", "]", "<",
">", ".", "/,", "1", "2", "3", "4", "5", "6", "7", "8", "9", "0", ","]
>>> For i in text:
…   If i in not_word:
…      Text=text.replace(i, "").lower()
>>> tmp_lst=text.split(" ")
>>> pos_count=0
>>> neg_count=0
>>> For i in tmp_lst:
…   If i in pos:
…      pos_count=pos_count+1
…   elif i in neg:
…      neg_count=neg_count+1
>>> If neg_count==pos_count:
…   Print ("Sentiment= Neutral")
>>> elif pos_count>neg_count:
…   Per=((pos_count-neg_count)/pos_count)*100
…   Print ("Sentiment= {} % positive".format(per))
>>> elif neg_count>pos_count:
…   Per= ((neg_count-pos_count)/neg_count)*100
…   Print ("Sentiment= {} % negative".format(per))
```

Sentence	Positive Percentage	Negative Percentage	Overall result
Awful experience. I would never buy this product again!	00	100	Highly Negative
High quality pants. Very comfortable and great for sport activities. Good price for nice quality! I recommend to all fans of sports	100	00	Highly Positive
I still need to further test Zapier to say if it's useful for me or not	50	50	Neutral

V. CONCLUSION

Till now, we have discussed about the primer of artificial intelligence viz. it's meaning, background, it's type, algorithms etc.

Now, we can say AI now a days is being employed in nearly each field of study through numerous prototypes. The target goal of AI is to formulate the machine in such a way that it is trained well enough so that it can do the several tasks which a human brain can do like recognize voices, recognize patterns, mathematical calculations and many more. And it is moving forward in touching a improved world.

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