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| Name Of The Student | Himanshu |
| Internship Project Topic | TCS iON RIO-210: Build a Classification Model for Drug Trials Dataset |
| Name of the Organization | TCS iON |
| Name of the Industry Mentor | Himdweep Walia |
| Name of the Institute | Amity University |

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| Date | Day # | Hours Spent |
| 15-05-2024 | Day-23 | 5 Hours |
| **Learn about the accuracy checking of Machine learning models.**  **Perceptron Model in Machine Learning:**  **What is the Perceptron Model?**    A perceptron model, in Machine Learning, is a supervised learning algorithm of binary classifiers. A single neuron, the perceptron model detects whether any function is an input or not and classifies them in either of the classes.  There are 4 constituents of a perceptron model. They are as follows-   * Input values * Weights and bias * Net sum * Activation function   **Input Nodes or Input Layer:**  This is the primary component of Perceptron which accepts the initial data into the system for further processing. Each input node contains a real numerical value.  **Wight and Bias:**  Weight parameter represents the strength of the connection between units. This is another most important parameter of Perceptron components. Weight is directly proportional to the strength of the associated input neuron in deciding the output. Further, Bias can be considered as the line of intercept in a linear equation.  **Activation Function:**  These are the final and important components that help to determine whether the neuron will fire or not. Activation Function can be considered primarily as a step function.  The perceptron model enables machines to automatically learn coefficients of weight which helps in classifying the inputs. Also recognized as the Linear Binary Classifier, the perceptron model is extremely efficient and helpful in arranging the input data and classifying the same in different classes.  There are 2 types of perceptron models-   * **Single Layer Perceptron-** The Single Layer perceptron is defined by its ability to linearly classify inputs. This means that this kind of model only utilizes a single hyperplane line and classifies the inputs as per the learned weights beforehand. * **Multi-Layer Perceptron-** The Multi-Layer Perceptron is defined by its ability to use layers while classifying inputs. This type is a high processing algorithm that allows machines to classify inputs using various more than one layer at the same time.   **The Perceptron Algorithm:**  Frank Rosenblatt suggested this algorithm:   * Set a threshold value * Multiply all inputs with its weights * Sum all the results * Activate the output   **1. Set a threshold value:**  Threshold = 1.5  **2. Multiply all inputs with its weights:**  x1 \* w1 = 1 \* 0.7 = 0.7  x2 \* w2 = 0 \* 0.6 = 0  x3 \* w3 = 1 \* 0.5 = 0.5  x4 \* w4 = 0 \* 0.3 = 0  x5 \* w5 = 1 \* 0.4 = 0.4  **3. Sum all the results:**  0.7 + 0 + 0.5 + 0 + 0.4 = 1.6 (The Weighted Sum)  **4. Activate the Output:**  Return true if the sum > 1.5 ("Yes I will go to the Concert")  **A step-by-step procedure in order to understand the way the perceptron model operates.**   * Enter bits of information that are supposed to serve as inputs in the first layer (Input Value). * All weights (pre-learned coefficients) and input values will be multiplied. The multiplied values of all input values will be added. * The bias value will shift to the final stage (activation function/output result). * The weighted input will proceed to the stage of the activation function. The bias value will be now added. * The value procured will be the output value that will determine if the output will be released or not.   The perceptron algorithm, using the Heaviside activation function is summarised as follows-     |  | | --- | | f(z) = {1 if xTw+b > 0  = {0 otherwise |  * The Input value of the model consists of various artificial neurons in artificial intelligence that facilitate the entry of data into the system or machine. * When the inputs are registered in the machine, the perceptron algorithm primarily applies the already learned value of weight (dimension or strength of the connection between data units). These weights are then multiplied with the input values and headed to the net sum (total value). * Ultimately, the input value proceeds to the activation function where output is released or scrapped out. The activation function (weighted sum total added with bias) in the final stage is important for determining if an input’s value is greater than 0. * The process that enables the perceptron model to conduct mathematical operations for converting input into output is called training. As the process of training is implemented in the working of the perceptron model wherein machines are made fully capable of calculating output values even without being fed with input values. * The process of training involves feeding machines with historic data in order to prepare them for the future and instill predictive patterns. Based on artificial neural networks that tend to imitate the human brain, the perceptron model works along the lines of machine learning as it continuously interprets data and produces qualitative patterns.   **Characteristics of Perceptron**  The perceptron model has the following characteristics.   * Perceptron is a machine learning algorithm for supervised learning of binary classifiers. * In Perceptron, the weight coefficient is automatically learned. * Initially, weights are multiplied with input features, and the decision is made whether the neuron is fired or not. * The activation function applies a step rule to check whether the weight function is greater than zero. * The linear decision boundary is drawn, enabling the distinction between the two linearly separable classes +1 and -1. * If the added sum of all input values is more than the threshold value, it must have an output signal; | | |