# Lecture\_3a

Hello and welcome to the first lecture in this week. We will be talking about a regression.

And in this lecture video, we're going to start with a recap of supervised learning and we are going to focus on regression.

Again, as you already know, supervised learning techniques are a form of classification or regression for classification techniques. We are mainly interested in predicting descant responses, whereas. For regression techniques, we are mainly interested in predicting continuous responses, such as changes in environmental conditions. When can regression techniques be used? If the data comprises of real valued numbers over ranges, then regression techniques are to be employed. Regression in machine learning is also called regression analysis or regression model in. Conventionally, regression is the process of estimating the relationships between a dependent variable, often called the target or outcome variable, and one or more independent variables, often called features or predictors.

Take for instance, in this image here, we have the Y variable to be the dependent variable and we have the X variable to be the independent variable, and we have a regression line estimating the relationships between X and Y. In machine learning, regression models mainly work by building a mathematical equation, or relation that defines the target as a function of the predictor. And as you can see, both the predictor and the target are observed in the data. For datasets where we have more than one predictor, then, we expect the independent variables to be in a vector form. Beta also captured in the function, referred to unknown parameters that are also associated with the predictor. An error terms is not directly observed in the data captured by e.

Once this equation, or relation has been established, then it can be used to predict the outcome

Y based on new values of X. Regression analysis are several forms of variations, but broadly speaking, there are three popular forms: linear regression, multiple linear regression and nonlinear regression. Primarily linear regression works by attempting to model the relationship between two variables by fitting a linear equation to observed data, similar to the equation that were shown previously. One variable is considered to be an explanatory variable and the other variable is consider to be the dependent variable. Intuitively, we can tell that the explanatory variable is going to be the predictor variable and the dependent variable is going to be the target variable. Take for instance, if an organisation's sales have increased steadily every month for the past few years, by carrying out a linear regression analysis on the sales data with monthly sales, the company could forecast sales in future months, as illustrated in this diagram. As a statistical modelling technique, linear regression is used to describe a continuous response variable as a linear function of one or more predictor variables.

If the predictor variables are more than one, then it is referred to as multiple linear regression (to be discoursed next). Linear regression models are very simple to interpret and train and they are often used as the baseline for evaluating in order more complex regression models. Multiple linear regression is also called multiple regression. Multiple linear regression works by attempting to model the relationship between two or more explanatory variables and a response variable by fitting a linear equation to observe data, very similar to linear regression. However, there are multiple predictors or explanatory variables in the case of multiple linear regression. Multiple linear regression is used extensively in econometrics and financial inference applications. This can be observed in the diagram, nonlinear regression relates to variables, that is the explanatory variable, and the response or predictor variable in a nonlinear or curved relationship as show. As a statistical modelling technique, nonlinear regression helps to describe the nonlinear relationships in experimental data. Regression models based on this type of regression that is nonlinear

regression models are generally assumed to be parametric. When we have datasets or observations that show very strong, nonlinear trends without an ease of transformation into linear spaces, then nonlinear regression models can be employed. A vivid example is population growth over time.

In this lecture video, we have looked at a recap of supervised learning and we've also discussed regression analysis and three forms of regression analysis, linear regression, multiple linear regression and nonlinear regression.