A Monthly Insight into the Current Real Estate Market | Issu

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Situations for Nonlinear Regression:

There are many instances where nonlinear regression is useful. A few examples are predicting stock prices, air pollution levels, and energy consumption. In our group, we will use nonlinear regression to predict housing market prices. Nonlinear regression is ideal for situations where the relationship between dependent and independent variables does not result in a straight line. Nonlinear regression allows complex modeling and can provide more accurate predictions as opposed to linear regression. This is particularly important when modeling multi-variable interactions and modeling growth patterns.

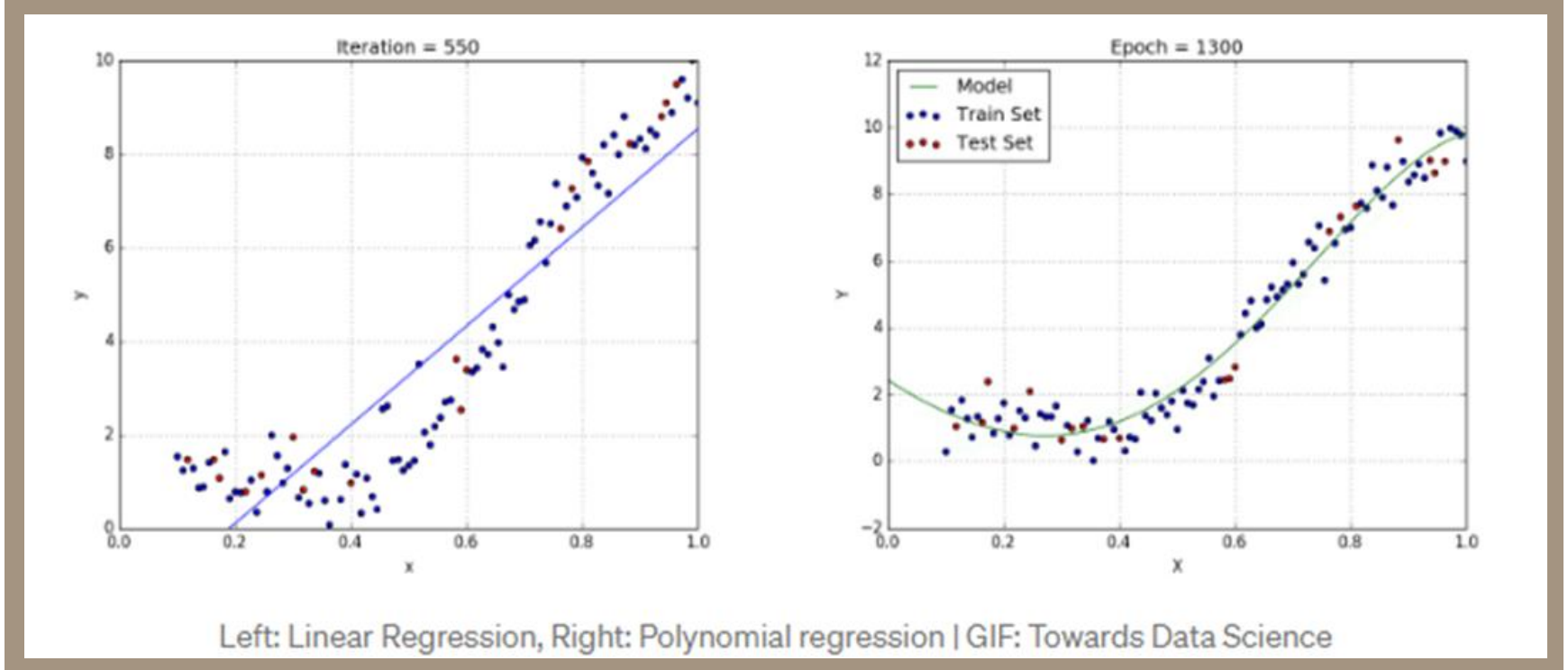
How to Sell Your Home During an Economic Downturn:

A Polynomial Regression Analysis of the Miami, FL Housing Market

Polynomial regression is another method to determine the relationship between an independent and a dependent variable and to model their relationship as an nth-degree polynomial. This model demonstrates a curvier model than that of linear regression due to the polynomial equation. This model is used when there is no linear correlation between the variables. The most common polynomial regression equation can be written as: Y= b0+a1x+a2x^2+a3x^3+…. anx^n

The value a2x^2 value is a quadratic equation and the a3x^3 is a cubic equation. When determining the line of best fit in polynomial regression the scatter plot of the data is analyzed for a pattern then the curve is drawn following the pattern of the points. Along with linear regression, outliers tend to have an impact on the results.

Below is a snapshot of the difference between linear regression on the left and polynomial regression on the right. As you can see the linear regression does not fully fit with the data, but with the polynomial regression the fitting is much more accurate.



Left: Linear Regression, Right: Polynomial regression | GIF: Towards Data Science

To ensure the data accurately fits the model, there are several types of tests that can be performed. One of the tests is a goodness-of-fit test a goodness-of-fit test can be run to determine if the data fits the model by comparing observed values to the predicted values. Another way to determine if the data is a good fit is the Akaike information criterion (AIC) as well as the Bayesian information criterion (BIC). This can be used to compare the goodness of fit of different models with different degrees of polynomials. The model with the lower AIC and BIC would be the better fit. Further, an F change test can be used to test accuracy. If the F change test results in significance, that would mean that the model with the greater number of values provides a better fit.

Creating Curb Appeal

Making a good first impression counts!

To effectively address our topic, datasets that include both independent and dependent variables are required. The predictor variables do not need to have a specific relationship, as the model will utilize these relationships to predict the outcome with the highest success rate. Also, there isn't a specific number of predictors needed to perform the evaluation, the fit can be done with one or more. Generally, the greater the sample size the better the model will perform.

The assumptions for nonlinear regression are largely the same as those for linear regression, with one exception. The linearity assumption is replaced by a nonlinear function of unknown parameters in the regression function. The remaining assumptions include homoscedasticity, meaning the residual variance is consistent for all values of X, independence, indicating that observations are not influenced by one another, and normality, where Y is normally distributed for any fixed

The Analysis Tool You Haven't Heard of That Will Make Your Projects Pop – The Generalized Additive Model

GAM is a powerful and yet simple technique. Hence, the purpose of this post is to convince more data scientists to use GAM. Of course, GAM is no silver bullet, but it is a technique you should add to your arsenal. Here are three key reasons:

- Easy to interpret.
- Flexible predictor functions can uncover hidden patterns in the data.
- Regularization of predictor functions helps avoid overfitting.

finalThoughts & References...

Learning References (5):

Polynomial Regression for Non-Linear Data - ML - GeeksforGeeks
What Is Nonlinear Regression? Comparison to Linear Regression (investopedia.com)
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8432702/
https://www.voxco.com/blog/polynomial-regression-everything-you-need-to-know/
https://towardsdatascience.com/introduction-to-linear-regression-and-polynomial-regression-f8adc96f31cb
Example of Nonlinear Regression - Minitab

Nonlinear Regression in R (3):

Polynomial Regression in R (Step-by-Step) - Statology
STHDA - Home
First steps with Non-Linear Regression in R | R-bloggers
RPubs - Polynomial Regression
R Applications — Part 7: Nonlinear Regression Models | by Burak Dilber | Data Science Earth | Medium
RPubs - Non linear regressions in R

Additional Resources (2):

Polynomial Regression. This is my third blog in the Machine... | by Animesh Agarwal | Towards Data Science (Both)
Non-Linear Regression in R - Implementation, Types and Examples - TechVidvan (Both)

5432 Any Street West
Townsville, State 54321

Ayana, Jacquelyn, & Dave
A REAL ESTATE COMPANY