Artificial Intelligence

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Linear Regression

Explore the power of linear regression. Discover how it uncovers relationships within data. This presentation simplifies the concepts. Gain insights into its practical applications.

Dependent vs. Independent Variables

Independent Variable (X)

The predictor. Changes influence the dependent variable.

Dependent Variable (Y)

The outcome. Its value depends on the independent variable.

Linear regression seeks to model how **Y** changes as **X** is manipulated. Understanding this relationship is key. It allows for predictions based on observed data.

The Equation: y = mx + b

y

The predicted value

m

The slope of the line

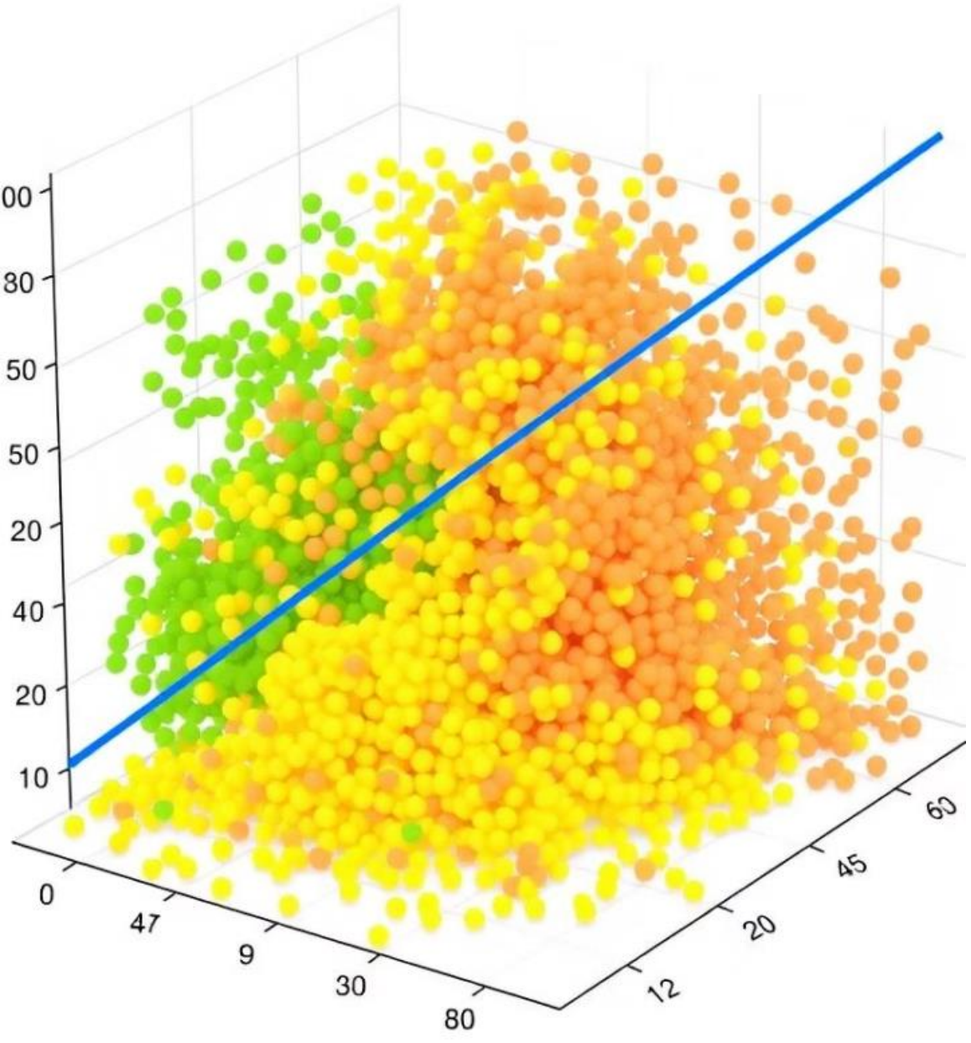
x

The input value

b

The y-intercept

The equation represents a straight line. Each component plays a role in defining the line's position. The slope dictates the rate of change. The intercept indicates the starting point.



Ordinary Least Squares: Minimizing Error

1

Data Points

Plot all data points on a scatter plot.

2

Regression Line

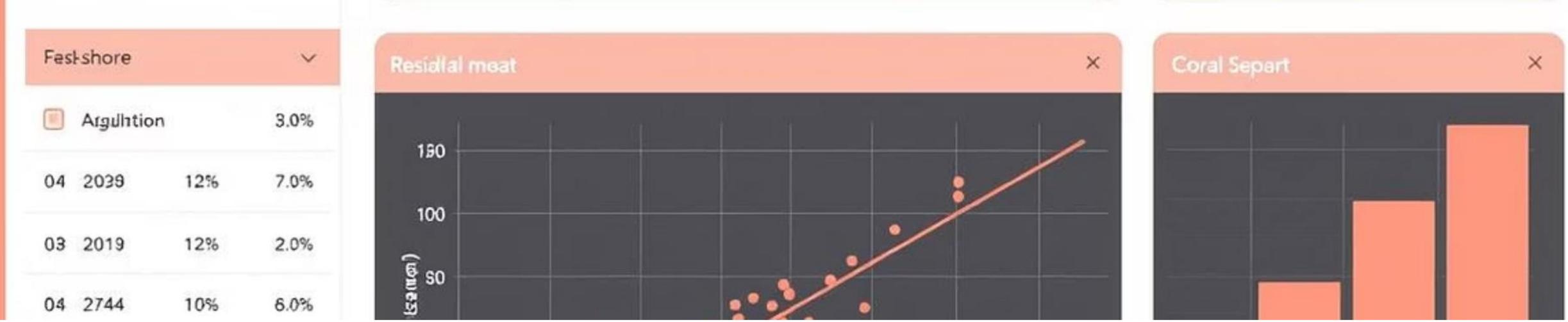
Draw line minimizing distance to points.

3

Error

Calculate error as the difference between actual and predicted values.

OLS finds the best-fitting line by minimizing squared errors. This ensures no single outlier unduly influences the model.



Assessing Model Accuracy

Accuracy

Ratio of correct predictions to total predictions.

Accuracy measures how well the model predicts correctly. A higher accuracy represents better model performance.

Common Pitfalls to Avoid

Outliers

Extreme values greatly affect line position.

Overfitting

Model captures noise rather than true relationships.

Identify and handle outliers carefully. Use techniques like cross-validation to avoid overfitting. Regularization is a solution. Both damage the accuracy of the model.

Real-World Applications

Real Estate

Predicting property prices based on location and size

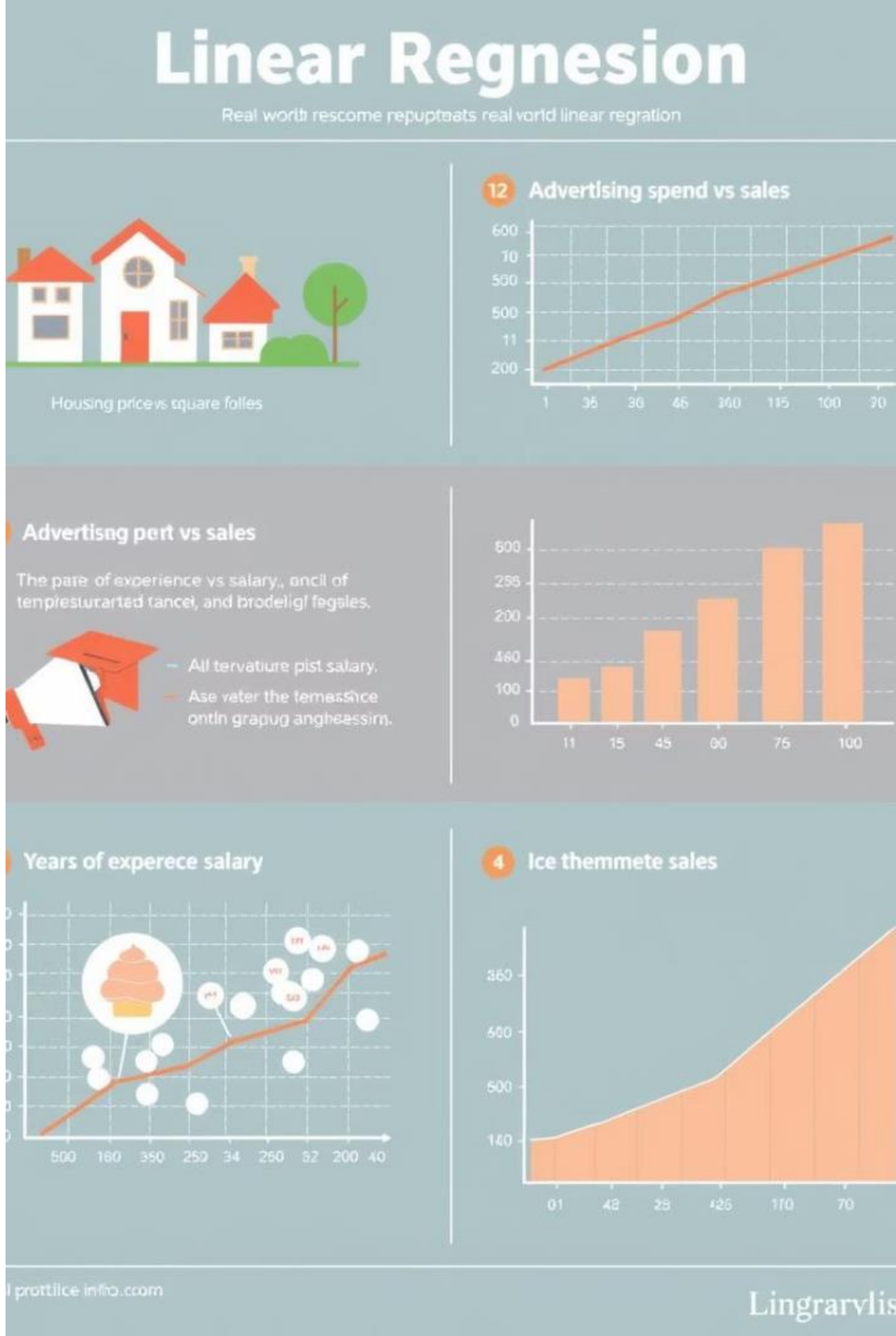
Finance

Assessing stock market trends and predicting financial risk

Marketing

Optimizing advertising campaigns by predicting consumer behavior

From predicting home values to optimizing marketing, linear regression is a cornerstone for analysis.



Next Steps

1

Multiple Regression

Extend regression to multiple independent variables

2

Polynomial Regression

Model non-linear relationships

Linear regression is the starting point. Move to more complex models to capture nuanced relationships.

Thank You