1. Title:

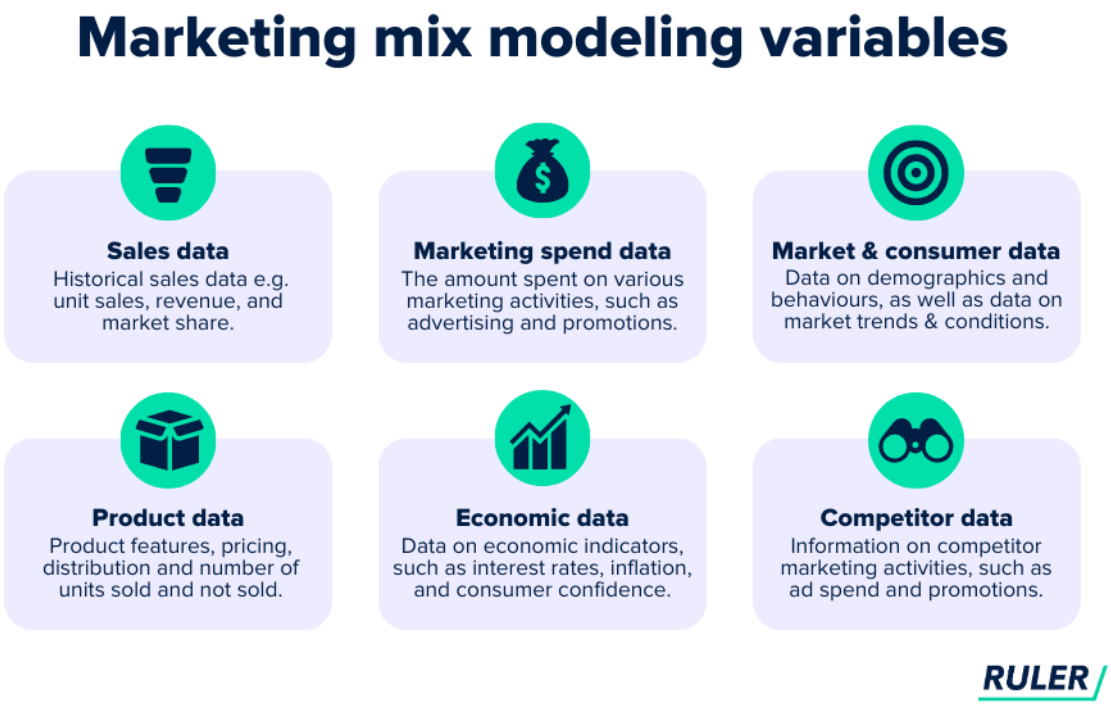
Market Mix Models Using Advanced Regression Methods

2. Project Statement:

Understanding the impact of various marketing channels on sales or revenue is crucial for optimizing marketing strategies and budget allocation. Market Mix Modelling (MMM) is a statistical approach that quantifies the individual contributions of different marketing channels, such as TV, radio, digital ads, and more. This project aims to develop advanced regression models to accurately estimate the incremental sales or revenue attributable to each marketing channel.

Outcomes:

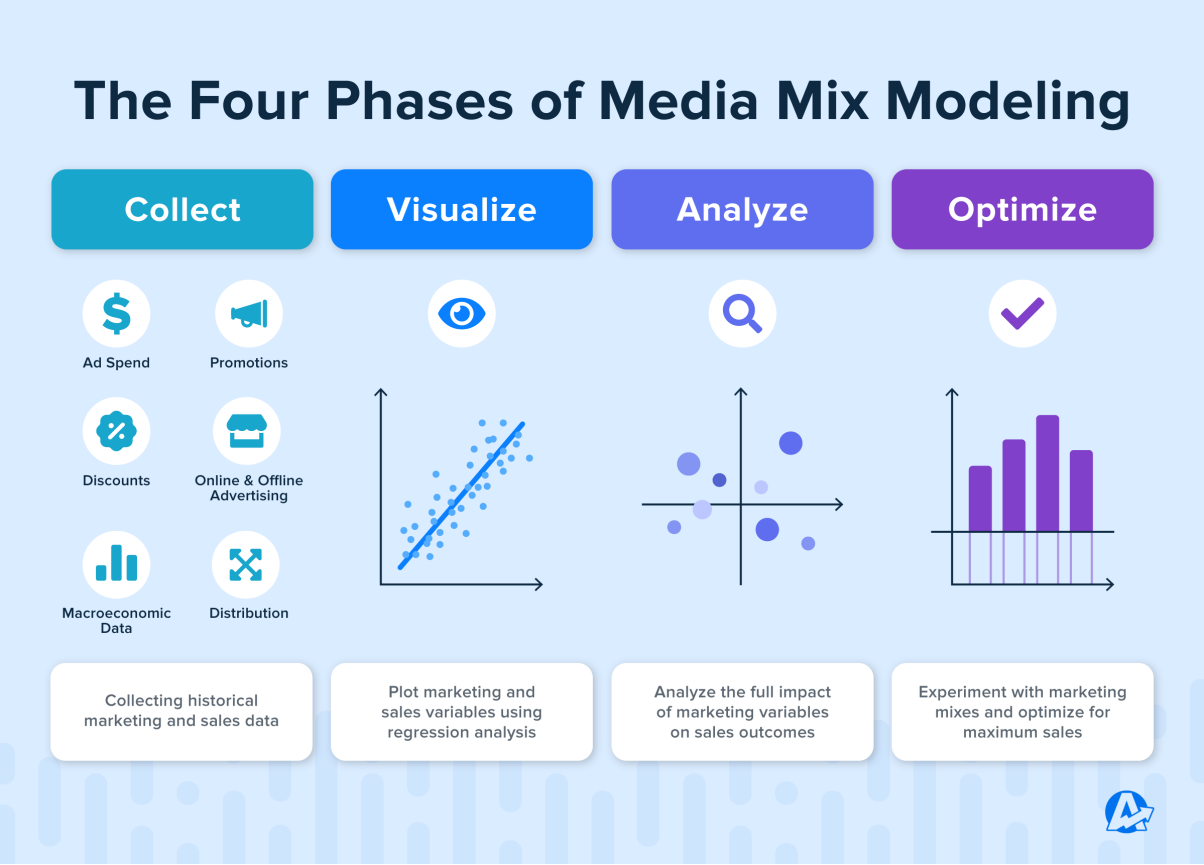
- Develop a market mix model to quantify the individual contribution of each marketing channel.
- Optimize the model using advanced regression techniques and hyperparameter tuning.
- Provide actionable insights for marketing budget allocation to maximize sales or revenue.



Modules to be Implemented:

1. **Data Collection – Historical marketing spend data and corresponding sales/revenue data**
2. **Data Exploration (EDA) and Data Preprocessing**
3. **Build and Train Advanced Regression Models**
4. **Hyperparameter Tuning**

5. **Performance Metrics Evaluation**
6. **Quantify Incremental Contribution**
7. **Presentation and Documentation**



3. Week-wise Module Implementation and High-level Requirements with Output Screenshots

Milestone 1: Weeks 1-2

Module 1: Data Collection

- Understand the problem statement and define project objectives.
- Collect data from multiple sources including historical marketing spend data, sales data, and external factors like seasonality.
- Finalize the master dataset.
- Sample dataset related to market mix modelling can be found at Marketing Data on Kaggle.

Module 2: Data Exploration and Data Preprocessing

- Use various plots to understand the marketing and sales data.
- Perform univariate and bivariate analysis on features.
- Plot distribution of independent variables and sales/revenue.
- Perform missing value analysis and handle outliers.
- Create correlation plots and calculate VIF.

- Scale and transform data where necessary.

Milestone 2: Weeks 3-5

Module 3: Build and Train Advanced Regression Models

- Design and develop regression models using techniques such as Linear Regression, Ridge Regression, Lasso Regression, and Elastic Net, Machine learning models(if possible)
- Implement polynomial and interaction terms if necessary.
- Use techniques like cross-validation to ensure the robustness and generalizability of the models.

Milestone 3: Weeks 6-7

Module 4: Hyperparameter Tuning and Calculation of Performance Metrics

- Use grid search or random search to explore multiple values for hyperparameters.
- Finalize the model based on the best performance metrics.
- Test the model on a validation dataset and capture performance metrics such as R-squared, Adjusted R-squared, RMSE, and MAE, MAPE

Module 5: Quantify Incremental Contribution

- Decompose the total sales/revenue into contributions from each marketing channel.
- Calculate the incremental sales or revenue attributable to each channel.
- Visualize the contribution of each marketing channel using bar charts, pie charts, etc.

Milestone 4: Weeks 8

Module 6: Presentations and Documentation

- Prepare a presentation detailing the problem statement, data collection process, data preprocessing methods and outcomes, model building methodology, hyperparameters, performance metrics, and recommendations.
- Compile a project document capturing the above topics in detail.
- Submit the final code and documentation on GitHub.

Evaluation Criteria:

Milestone 1 Evaluation (Week 2):

- Approval of the master dataset to be used.
- Approval of the independent variables based on univariate and bivariate analysis.
- Approval of data preprocessing techniques.
- Approval of data treatments performed on the dataset.

Milestone 2 Evaluation (Week 3-5):

- Approval of the advanced regression models and architectures to be used on the master dataset.

Milestone 3 Evaluation (Week 6-7):

- Approval of the hyperparameter tuning process and the range of parameters explored.
- Completion and approval of performance metrics for all built models.

Milestone 4 Evaluation (Week 8):

- Approval of the final model.
- Approval of the presentation and project documentation.
- Approval of remediation/action plans for the business.
- Final code submission on GitHub.