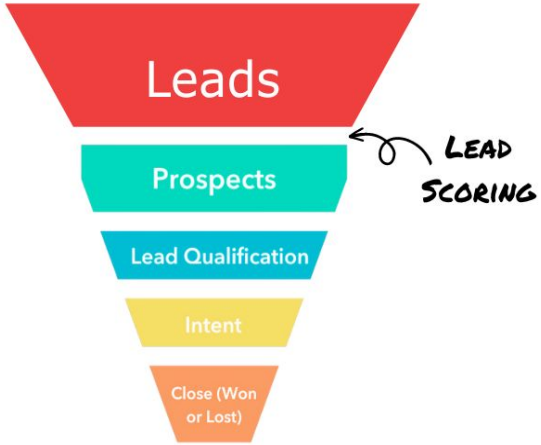
Sales & Mkt Summit: Optimizing Lead Conversion for X Education

Yuleica Ledezma
Data Analyst, Corporate Sales and Marketing

Executive Summary

- **Objective:** Boost lead conversion rates by predicting high-conversion leads using machine learning models.
- **Current Process:** Manual lead scoring based on intuition and limited data, resulting in inefficiency.
- **Goal:** Develop a predictive model that improves the sales **team's focus and efficiency, providing more precise leads,** which will result after implementation *(outside the scope of this project)* to raising the current conversion rate from 38%.



Performance Metrics

•Not only focusing on **Accuracy** (how often the model is correct)

Precision: Fewer false positives, enabling the sales team to focus on higher-quality leads.

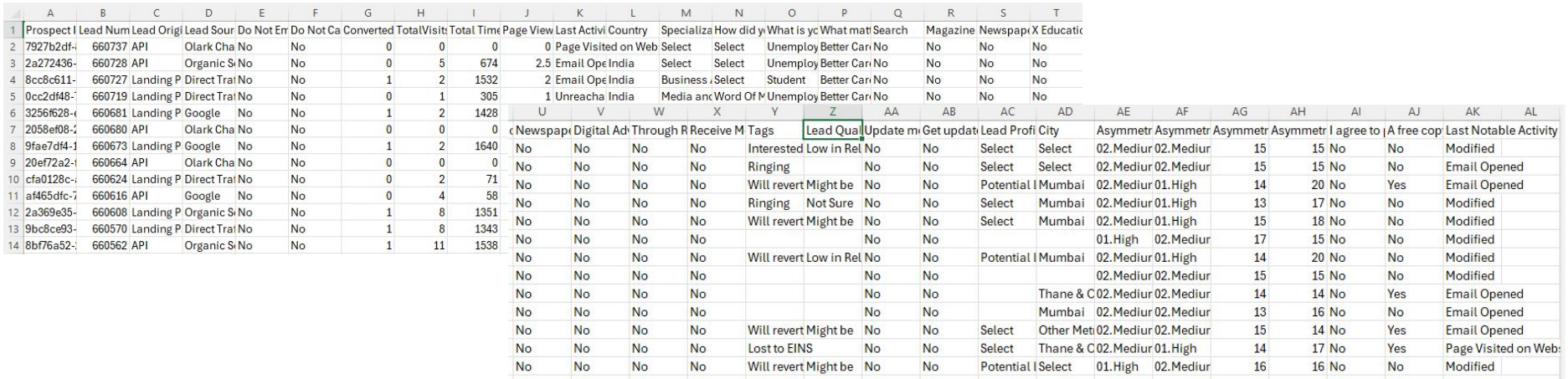
•**Recall:** Captured more potential leads, ensuring no opportunities were missed.

Goal to reach 85% on each

Data Sources

From our partner department [Kaggel Leads Dataset](), they created a dataset that comprises of:

- Website Activity
- Interest Survey/ Program Inquiry response
- Sales interactions
- Manual Scoring based on leads activity (large set of missing values)



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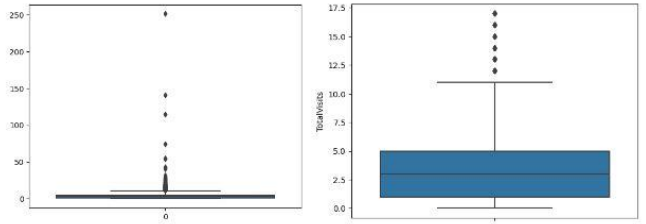
Data Overview and Preprocessing

•Dataset Size: **9,241 rows and 37 columns**, sourced from a Kaggel Leads Dataset.

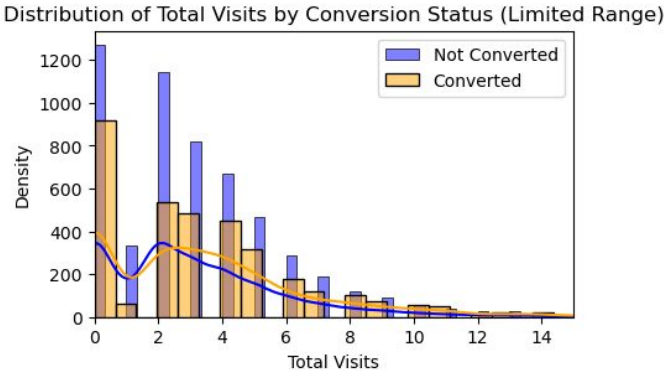
- Numerical (7)
- Categorical (30)



Data Preprocessing: Handle missing values, standardize categorical variables through one-hot encoding, and scale numerical features.

Challenges:

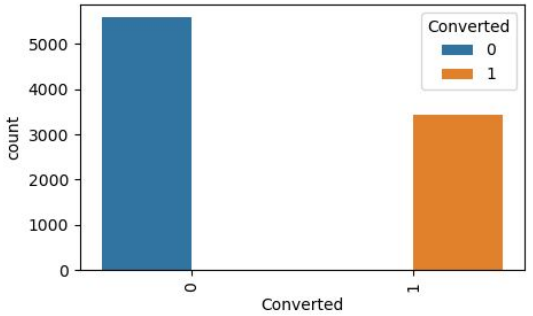
- Large number of null values (~15%, distributed unevenly in different columns)
- Skewness
- Outliers

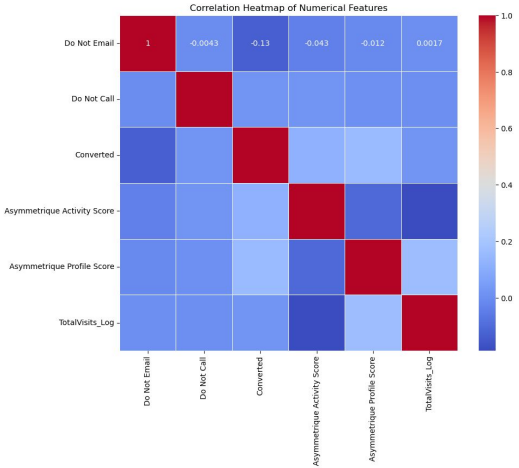


Challenges (cont)

• Significant **class imbalance** (~ 60% not converted vs. ~40% converted), which could affect the models favoring the majority class. For this reason Accuracy is not the only metric, will focus also in Precision and Recall

- Affecting models
- Logistic Regression assumes a balanced class distribution





No strong correlations were found, allowing the model to use a broader set of features

Machine Learning Models Tested

Models Evaluated:

- **Logistic Regression** (Baseline)
  - Logistic Regression with PCA
- **Random Forest**
  - Random Forest with Hyperparameter Tuning (GridSearchCV)
- **Neural Networks**

  Layers: 2 hidden layers

  Neurons:

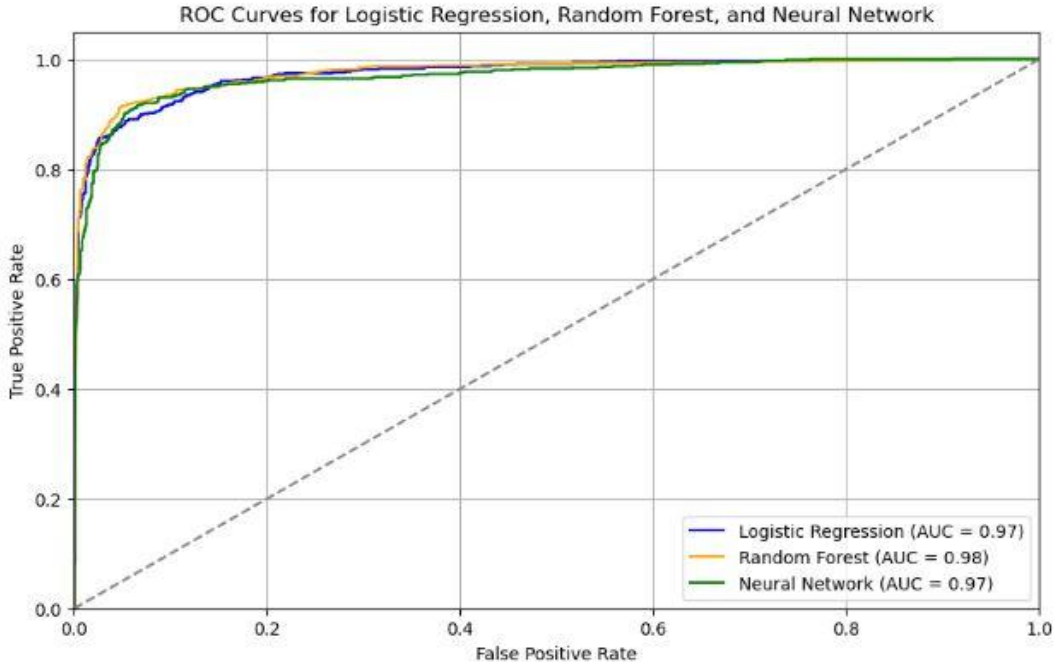
  64 neurons in the first layer

  32 neurons in the second layer

  Activation Functions: ReLU for the hidden layers, Sigmoid for the output layer

  Neural Networks Keras Tuner
- **Performance Metrics**: Accuracy, Precision, Recall, and F1 Score.

Model Evaluation and Results



Model Evaluation and Results

	Log Regression(baseline)	Log Reg PCA	Random Forest	RF Hyperparameter Tuning	Deep Learning	Keras Tuner
Accuracy	.92	.92	.93	.94	.92	.94
Precision	.92	.93	.92	.94	.91	.95
Recall	.87	.87	.90	.90	.90	.89
F1 Score	.89	.90	.91	.92	.91	.91

Recommendation

- Recommended Model: **Random Forest with Hyperparameter Tuning.**
  - Achieve a mix between **precision and recall**, ensuring the sales team focuses on the highest-potential leads without missing opportunities.

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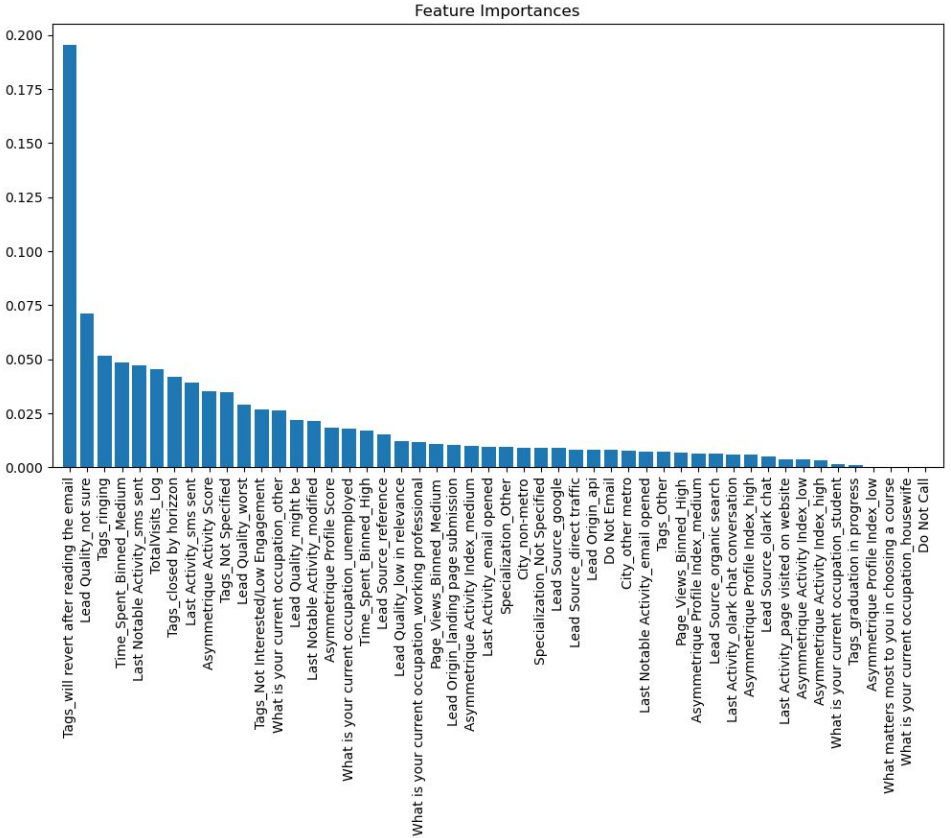
Precision	.92	.93	.92	.94	.91	.95
Recall	.87	.87	.90	.90	.90	.89
F1 Score	.89	.90	.91	.92	.91	.91

Business Impact: Saves time and boosts overall conversions.

Random Forest:

- Works well with **large datasets**.
- Handles **non-linear relationships** effectively.
- **Robust to noise and outliers**.
- Provides **feature importance** insights.
- Handles **class imbalance** and **categorical/numerical data** well.
- **Hyperparameter tuning**, it offers flexibility to achieve high accuracy, precision, and recall.



Key features correlating with conversions: website engagement and last marketing activity.

Conclusion

- Data-driven lead scoring improves efficiency and conversion rates.