Lead Scoring Case Study

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Background of X Education Company

An education company named X Education sells online courses to industry professionals.

On any given day, many professionals who are interested in the courses land on their website and browse for courses.

The company markets its courses on several websites and search engines like Google.

Once these people land on the website, they might browse the courses or fill up a form for the course or watch some videos.

When these people fill up a form providing their email address or phone number, they are classified to be a lead.

Once these leads are acquired, employees from the sales team start making calls, writing emails, etc.

Through this process, some of the leads get converted while most do not.

The typical lead conversion rate at X education is around 30%

Problem Statement & Objective of the Study

Problem Statement:

X Education gets a lot of leads, its lead conversion rate is very poor at around 30%

X Education wants to make lead conversion process more efficient by identifying the most potential leads, also known as Hot Leads

Their sales team want to know these potential set of leads, which they will be focusing more on communicating rather than making calls to everyone.

Objective of the Study:

To help X Education select the most promising leads, i.e., the leads that are most likely to convert into paying customers.

The company requires us to build a model wherein we need to assign a lead score to each of the leads such that the customers with a higher lead score have a higher conversion chance and the customers with a lower lead score have a lower conversion chance

The CEO has given a ballpark of the target lead conversion rate to be around 80%

Suggested Ideas for Lead Conversion

Leads are grouped based on their propensity or likelihood to convert.

This results in a focused group of hot leads.

We could have a smaller pool of leads to communicate with, which would allow us to have a greater impact.

We would have a greater conversion rate and be able to hit the 80% objective since we concentrated on hot leads that were more likely to convert. Since we have a target of 80% conversion rate, we would want to obtain a high sensitivity in obtaining hot leads

Analysis Approach

Data Cleaning: Loading Data Set, understanding & cleaning data

EDA: Check imbalance, Univariate & Bivariate analysis Data Preparation Dummy variables, test-train split, feature scaling

Model Building: RFE for top 20 features, Manual Feature Reduction & finalizing model

Model Evaluation: Confusion matrix, Cut-off Selection, assigning Lead Score

Predictions on Test Data: Compare train v/s test metrics, Assign Lead Score and get top features

Recommendation: Suggest top 3 features to focus for higher conversion & areas for improvement

Data Cleaning

"Select" level represents null values for some categorical variables, as customers did not choose any option from the list.

Columns with over 40% null values were dropped.

Missing values in categorical columns were handled based on value counts and certain considerations.

Drop columns that don't add any insight or value to the study objective (tags, country)

Imputation was used for some categorical variables.

Additional categories were created for some variables.

Columns with no use for modeling (Prospect ID, Lead Number) or only one category of response were dropped.

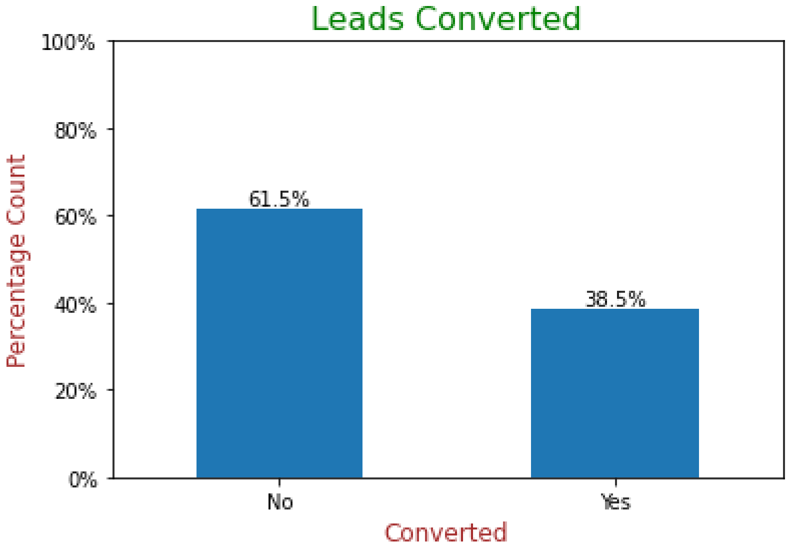
Numerical data was imputed with mode after checking distribution

Exploratory Data Analysis

Data is imbalanced while analyzing target variable.

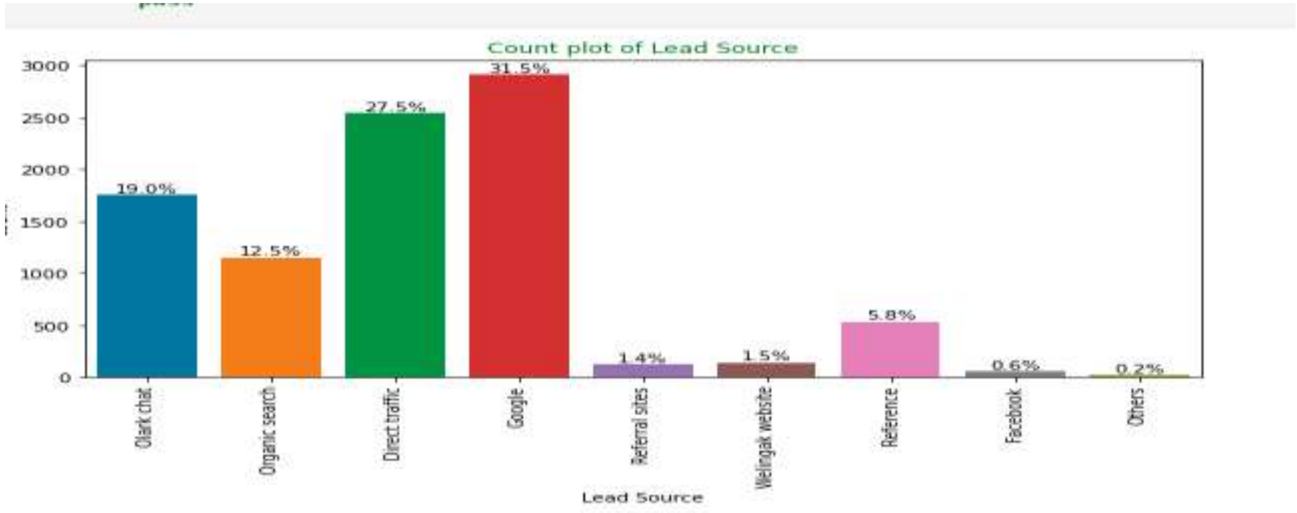
Conversion rate is of 38.5%, meaning only 38.5% of the people have converted to leads.(Minority)

While 61.5% of the people didn't convert to leads. (Majority)



Exploratory Data Analysis (Contd.)

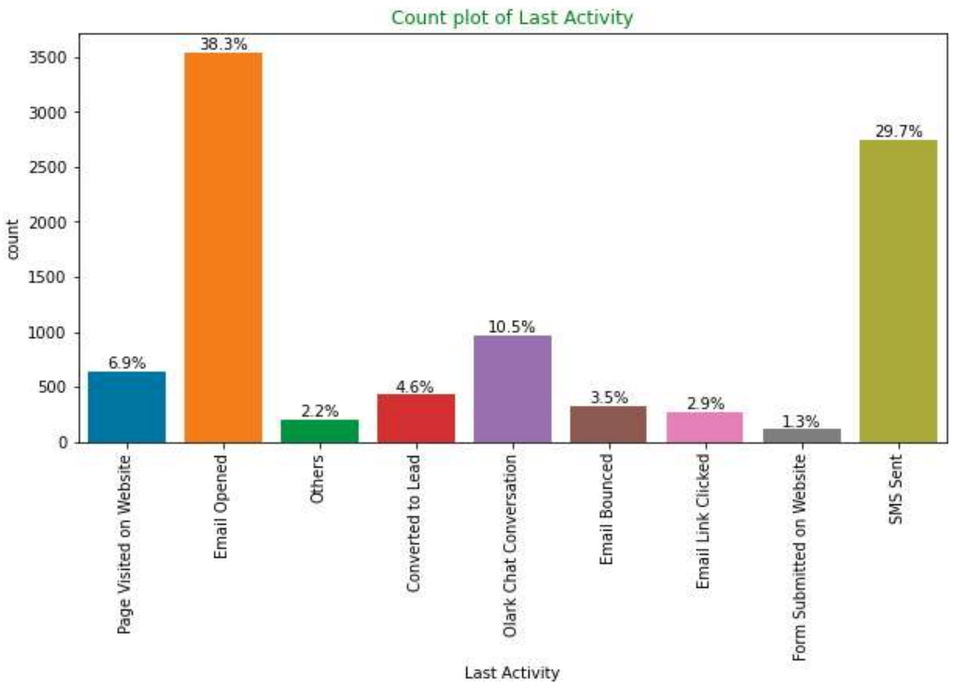
Univariate Analysis – Categorical Variables



Lead Source: 58% Lead source is from Google & Direct Traffic combine

Exploratory Data Analysis (Contd.)

Last Activity: 68% of customer contribution in SMS Sent & Email Opened activities.



Exploratory Data Analysis (Contd.)

Bivariate Analysis for Categorical Variables:

- Lead Origin:
  - "Lead Add Form" has high conversion rate but "API" and "Landing Page Submission" has low conversion
- Current occupation:
  - More "Unemployed" and "NA" are not converted.
  - Working professionals are converted
  - Marketing Managemt,HR Management,Finance Management shows good contribution in conversion.

Exploratory Data Analysis (Contd.)

Bivariate Analysis for Categorical Variables (Contd.):

- Lead Source:
  - Google has highest number of customers,
  - Direct Traffic contributes less compared to Google
  - Most of the referred employees are converted

- Last Activity:
  - 'SMS Sent' has high lead conversion rate
  - 'Email Opened' conversion rate

Data Preparation before Model building

Binary level categorical columns were already mapped to 1 / 0 in previous steps

Created dummy features (one-hot encoded) for categorical variables – Lead Origin, Lead Source, Last Activity, Specialization, Current occupation

Splitting Train & Test Sets ○ 70:30 % ratio was chosen for the split

Feature scaling ○ Standardization method was used to scale the features

Checking the correlations ○ Predictor variables which were highly correlated with each other were dropped (Lead Origin Lead Import and Lead Origin Lead Add Form)

Model Building

Feature Selection

- The data set has lots of dimension and large number of features.
- This will reduce model performance and might take high computation time.
- Hence it is important to perform Recursive Feature Elimination (RFE) and to select only the important columns.
- Then we can manually fine tune the model.

RFE outcome

- Pre RFE – 48 columns
- Post RFE – 20 column

Manual Feature Reduction process was used to build models by dropping variables with p – value greater than 0.05.

Model 4 looks stable after four iteration with:

- Significant p-values within the threshold (p-values < 0.05) and
- No sign of multicollinearity with VIFs less than 5

Hence, logm6 will be our final model, and we will use it for Model Evaluation which further will be used to make predictions

Model Evaluation

Train Data Set:

- Confusion Matrix & Evaluation Metrics with 0.354 as cutoff
- Confusion Matrix & Evaluation Metrics with 0.41 as cutoff
- It was decided to go ahead with 0.354 as cutoff after checking evaluation metrics coming from both plot.

ROC Curve – Train Data Set:

- Area under ROC curve is 0.89 out of 1 which indicates a good predictive model.
- The curve is as close to the top left corner of the plot, which represents a model that has a high true positive rate and a low false positive rate at all threshold values

Model Evaluation (Contd.)

Confusion Matrix & Metrics

Train Data Set

Test Data Set

Using a cut-off value of 0.354, the model achieved a sensitivity of 80.21% in the train set and 80.09% in the test set.

Sensitivity in this case indicates how many leads the model identify correctly out of all potential leads which are converting

The CEO of X Education had set a target sensitivity of around 80%.

The model also achieved an accuracy of 80.4%, which is in line with the study's objectives

Recommendation based on Final Model

As per the problem statement, increasing lead conversion is crucial for the growth and success of X Education. To achieve this, we have developed a regression model that can help us identify the most significant factors that impact lead conversion.

We have determined the following features that have the highest positive coefficients, and these features should be given priority in our marketing and sales efforts to increase lead conversion.

Lead Source_Welingak Website: 5.33

Total Time Spent on Website: 4.31

Lead Source_Reference: 2.95

Current_occupation_Working Professional: 2.41

Last Activity_SMS Sent: 1.91

Last Activity_Others: 1.36

Lead Source_Olark Chat: 1.20

Recommendation based on Final Model (Contd.)

TotalVisits	0.79
Last Activity_Email Opened	0.74

We have also identified features with negativecoefficients that may indicate potential areas for improvement. These include:

Last Activity_Olark Chat Conversation	-0.62
Specialization_Others	-0.93
Specialization_Hospitality Management	-0.99
Do Not Email	-1.05
Current_occupation_NA	-1.11
Lead Origin_Landing Page Submission	-1.13

Recommendation based on Final Model (Contd.)

To increase our Lead Conversion Rates :

- Targeted Marketing Strategies:
  - Focus on features with positive coefficients for effective marketing strategies.
- Attract High-Quality Leads:
  - Develop strategies to attract high-quality leads from top-performing sources.
- Tailored Messaging:
  - Engage working professionals with personalized messaging.
- Optimize Communication:
  - Enhance communication channels based on their impact on lead engagement

Recommendation based on Final Model (Contd.)

- Website Advertising:
  - Allocate more budget for advertising on the Welingak website.
- Target website visiting customers:
  - Consider customers who spent more time on the website
- Referral Incentives:
  - Offer incentives/discounts for successful referrals to encourage more references.
- Target Working Professionals:
  - Implement aggressive targeting of working professionals due to their high conversion rates and better financial capacity. To identify areas of improvement
- Analyze negative coefficients in specialization offerings.
- Review landing page submission process for areas of improvement
- To identify areas of improvement

Thank you