Lead Scoring

X Education

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Objective

Building Logistic regression model & assigning Lead Scores to the prospective candidates of X Education

Problem description

- X Education is an online Education company which has Lead database, some of which got converted & some didn‘t
- The typical lead conversion rate is 30% which is expected to be maximized to atleast 80%
- Target is to identify the ‘Hot Leads' which have a high conversion rate.
- The 'Hot Leads’ to be identified by cutoff Lead Scores
- Lead scores to be assigned to each candidates based on probabilities calculated by Logistic regression model

Contents

- Data Inspection and Missing value treatment
- Dummy variable creation
- Logistic regression modelling
- Model Accuracy Check
- Model fit on test data
- Conclusion
- Recommendations

Data Preparation

Data Inspection and Missing value treatment

- Columns containing >70% missing data were dropped.
- ‘City’ column had ~40% missing values & was dropped
- In absence of any visible correlation with Activity & Profile, these columns were dropped too
- *Asymmetric Index columns were checked for any possible relation to impute missing values
- Other columns with possible imputations were handled appropriately

Unique value columns

- Columns with only one type of unique values were dropped in absence of variability

Imputation

- High missing value containing columns were imputed with suitable values

Cleaned dataset

Lead Origin	Lead Source
Do Not Email	Converted
Total Visits	Total Time Spent on Website
Page Views Per Visit	Last Activity
Country	Specialization
Tags	Lead Quality
What is your current occupation	
A free copy of Mastering The Interview	
Last Notable Activity	

- After data cleaning, 15 column are left.

Outlier treatment

- Numeric columns were treated for Outliers
- Data within +/- 3*Standard deviation was retained

Dummy variables & Numerical encoding Train-Test split

- To start with Logistic regression, Dummy variables are created with Original Categorical variables are dropped after dummy creation.
- Yes & No values in columns are converted to 1 & 0 respectively.

The final dataset contains-

- Rows: 9112
- Columns: 150

Final dataset is split into train and test dataset in 70%-30% proportion.

- Train & Test data are split into X & y.
- y is taken as 'Converted', remaining variables as X.

Model Building

- 15 Features were selected using RFE.
- Six Logistic regression models were built iteratively
- Final model was selected based on:

  1. p-values <0.05 for all variables, indicating significance

  2. VIF < 5, indicating absence of multicollinearity

- Model performance measures-

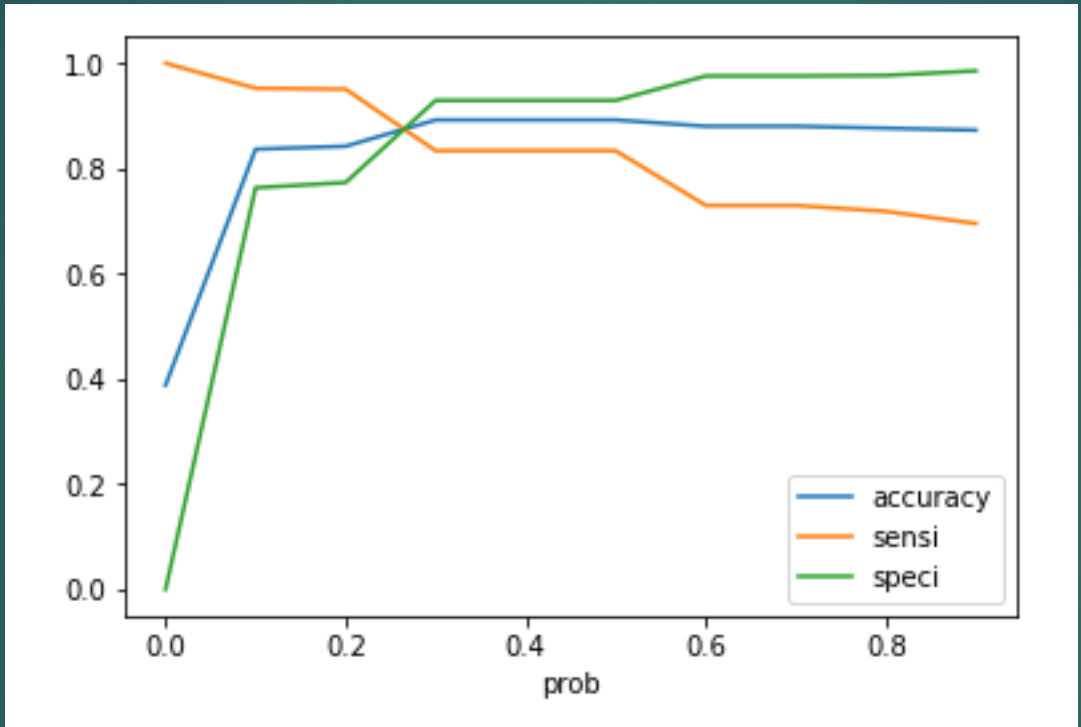
  1. High values of Accuracy, Sensitivity & Specificity indicate good predictive powers of model.

  2. Low False positive rate indicates model's ability to predict positive values accurately.

Accuracy	89.21%
Sensitivity	83.35%
Specificity	92.92%
False Positive Rate	7.07%
Positive Predictive Value	88.20%
Negative Predictive Value	89.79%

Model Accuracy Check

- Accuracy, Sensitivity & Specificity plot to find optimum cutoff for probability



- The three curves intersect at ~0.32.
- Model accuracy at this point is 89.21%, which is very close to earlier calculatedvalue.

Model fit on test data

- Final model was fit on the test data.
- Predictions of Converted values were made.
- The accuracy achieved on test dataset is also same at 88.84%.
- Sensitivity of 83.13% and Specificity of 92.30% was achieved.
- These measures indicate a good fit of model on the test data as well.

Conversion

- To calculate Conversion on the entire dataset, a master data frame was created with final y(s) from train and testsets.
- From train, ‘y_train_pred_final’ and from test, ‘y_pred_final’ are concatenated
- Cutoff Lead Score was applied on this dataset to select only Hot leads
- At Lead Score of 38, Conversion of 88% was achieved, which is more than target of 80%

Recommendations

- To get more customers, XEducation must keep the lead score lower, starting at '0'. But to achieve target conversion of greater than 80%, it should keep the cut off at 30.
- Thus, in the model, data frame changed for cut off Lead Score to gauge the Conversion percentages w.r.t. actual converted.
- Lowering the lead score cut off reduces conversion %, but it increases number of actual converted.
- Based on the man power availability with XEducation, it may decide to give weightage to **conversion %** or **actual numbers**.