**Summary report and Recommendations**

**On**

**LEAD SCORING Case Study**

**‘X Education’** is an EdTech company which sells online courses to industry professionals, and from this case study they want us to find the most promising leads who are most likely to convert to paying customers. The case study is performed on the **“Leads”** dataset and we achieved desired results from the following steps:

1. **Data Understanding:** We started with understanding the data which is very important for any business problem solving. We found the shape, size and info of the data frame, followed by checking the presence of missing values and duplicated rows. Then we proceeded towards the most important stage- **data cleaning.**
2. **Data Cleaning:** “Leads” data has some discrepancies like missing values, unique values, and a value called ‘Select’ which is as good as a null value since the customer has not selected any option for that category. We replaced **‘Select’** with **‘NaN’**, dropped columns which have extremely high null values (35% and above), dropped columns which have a unique value and provide no significant role in further analysis. For columns having <35% yet very high missing values, we have imputed those with a separate category as **‘Unspecified’** in order to avoid a biased model. We have combined low frequency values for some categorical columns to obtain lesser number of dummy variables and dropped some rows having missing values.
3. **Exploratory Data Analysis:** There is some data imbalance in the target column (**‘Converted’**); 3**8.37% of the total leads have converted while 61.63% have not.** We performed Univariate, Bivariate and Multivariate analysis on numerical and categorical columns separately with respect to the target variable. Some outliers have been observed but the number is not very large.
4. **Data Preparation:** Prepared the data for model building by performing some pre-processing steps like conversion of binary variables (Yes/No) to 1/0, creating dummy variables for other categorical columns and dividing the data into ‘X’ and ‘y’ data frames. We split the data into 70:30 Train and Test ratio and **used ‘Stratified Sampling’ to handle the data imbalance in target column. We rescaled the features using StandardScaler so that the units of the coefficients obtained are all on the same scale.**
5. **Model Building:** **Created a logistic regression model using RFE to get 15 features initially and dropped variables one by one manually on the basis of high P-value (>0.05) and high VIF (>5). Finally, we retained 12 variables in ‘X\_train’ data.**
6. **Model Evaluation: We plotted** ROC curve and evaluated an AUC of 0.89. Based on trade-off between **‘Precision’** and **‘Recall’**, we have considered the optimum cut-off point as 0.42 and obtained the following metrics on the **Training data**:

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| **Metric** | **Value (%)** |
| Accuracy | 81.48 |
| Recall | 76.29 |
| Precision | 75.65 |
| F1-Score | 75.97 |

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| **Metric** | **Value (%)** |
| Accuracy | 81.06 |
| Recall | 75.47 |
| Precision | 75.25 |
| F1-Score | 75.36 |

1. **Prediction on Test Data:** We made predictions on the **Test data** with an optimum cut-off of 0.33 and obtained these metrics:
2. **Summary:** The following features were found to be useful and it is advisable for ‘X Education’ to concentrate more on these factors for higher percentage of leads conversion.

* Lead Origin\_Lead Add Form
* Lead Source\_Olark Chat
* Occupation\_Student
* Occupation\_Unemployed
* Occupation\_Working Professional
* Last Notable Activity\_Others
* Last Notable Activity\_SMS Sent