SironLab: Supplier Performance

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Problem Statement

Selecting a supplier from among thousands and doing a predictive performance analysis is a challenge which most of the client's face. Evaluating supplier performance based on multiple attributes would not only help clients mitigate risk but also help reduce costs.

Create any new technology based go to market solution (either technologies mentioned above or other latest trends) that you feel will benefit strategy in the emerging markets.

Major issues arising in markets :

- **Fluctuating demand**
- **Missed discounts**
- **Lack of flexible pricing and customer incentives**
- **Lack of integrated planning**

Opportunity

Improving Supplier Analytics

Channelize data points (bills and feedback) by giving instant reward points through upi.

1. Understand habits of current supplier
2. Access needs though data points
3. Study parameters contributing the above two through AI models
4. Retain supplier through personalization by supplier profiling.

Solution

Customer Retention

Build a predictive model (AI Model) for retaining supplier to help the organization in better resource planning and improve experience .

Domains the solution can address

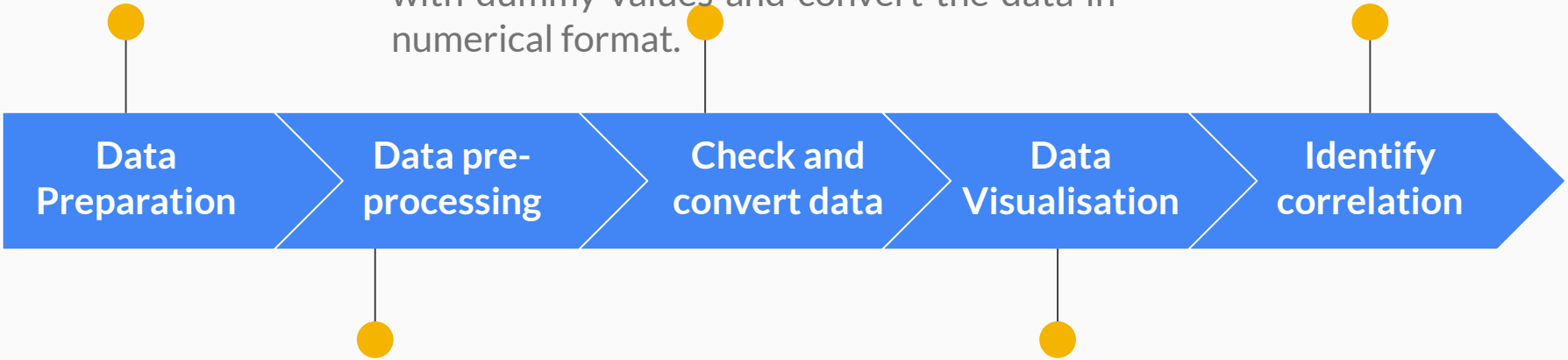
- Attrition means costly supplier acquisition.
- An intuitive supplier knows customer needs
- Succession planning to minimize costs
- Planning for retention and the relative costs associated well ahead of time

Flowchart for TurnUp

Data Preparation
Load, Clean and Format

To take a peek into categorical/object values we need to bind them with a numeric variable and then see their relevance to the dataset or replace the categorical variable with dummies.Replace categorical variables with dummy values and convert the data in numerical format.

The variables are correlated if they are, we might want to avoid those in model building process.



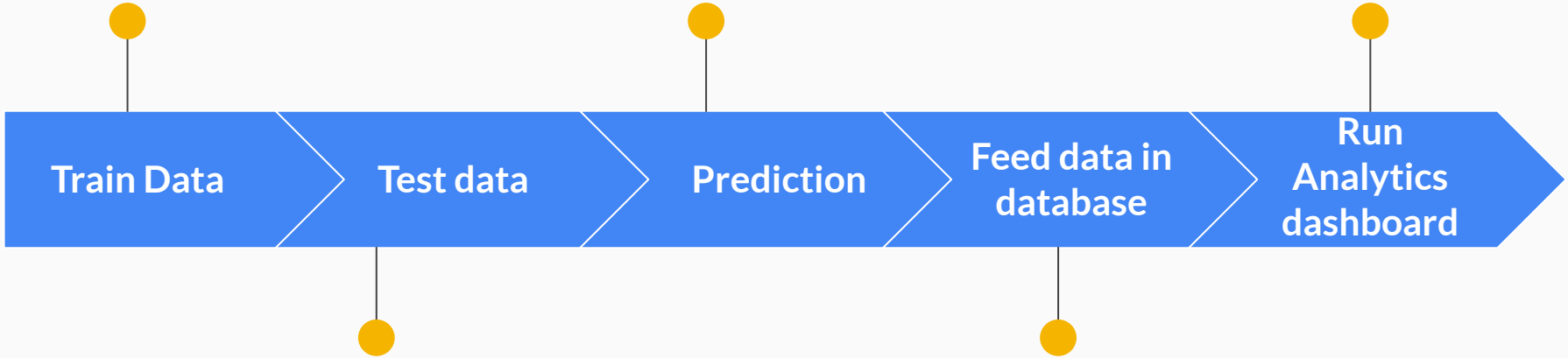
Missing values check

Understand data and the importance of different parameters.

Split data into 70-30 ratio.For training and testing data. Apply Random Forest.X are all the parameters contributing to the attrition rate .Y is the probability.

Predict the attrition result. Given a result of parameters.
Comprehend result

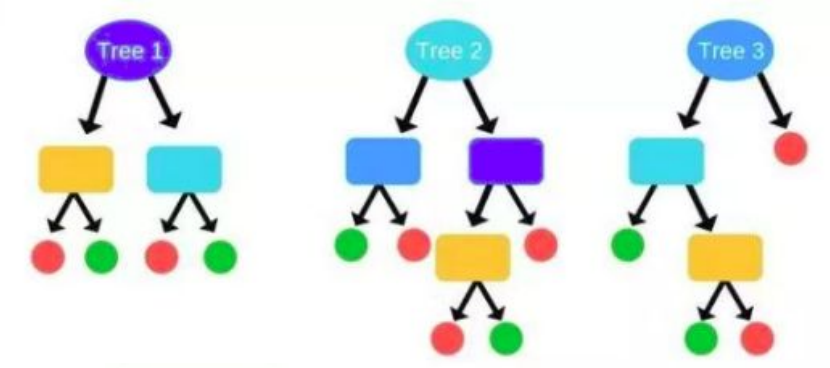
Show a dashboard of company performance given - Slide 13

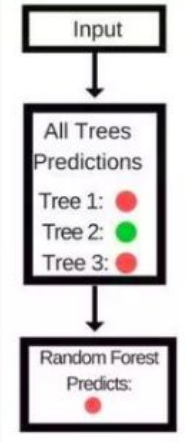


Apply Random Forest Algo made in the previous step for testing data and apply the same on training data and look for accuracy.

For this we can use AWS stack. A detailed diagram in slide no 14

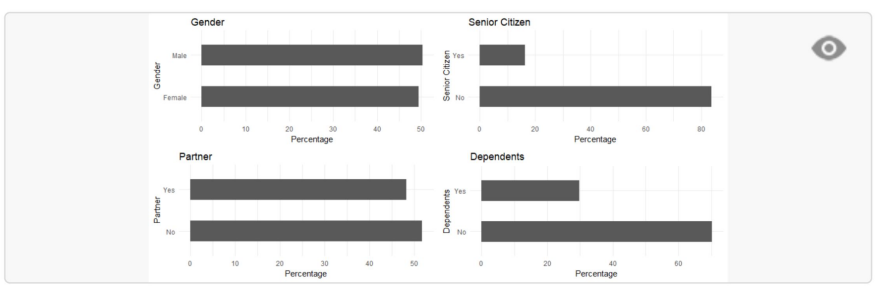
Solution Using Random Forest Classifier





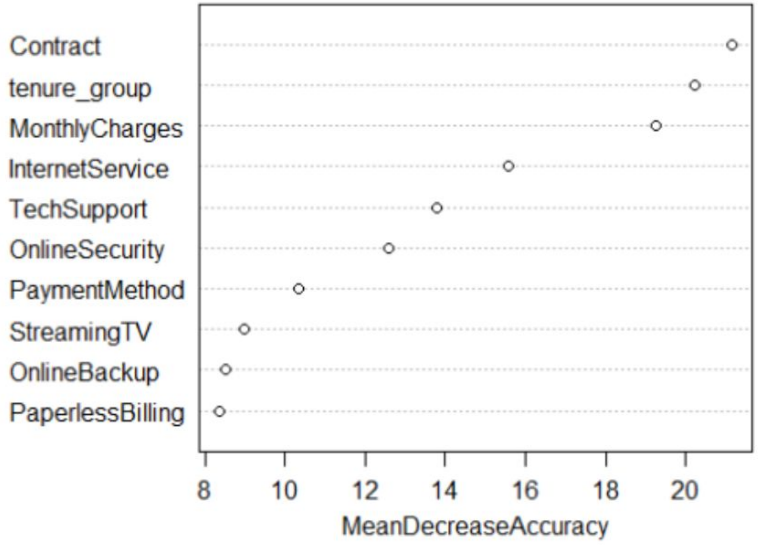
- The Random forest works on Bagging principle.
- It is an ensemble of Decision Trees.
- The bagging method is used to increases the overall results by combining weak models.
- In the case of Classification problem it takes the mode of the classes, predicted in the bagging process.
- The random forest works quite well even with the default parameters.
- Random forest also doesn't over fit easily because of its randomness feature

Correlation Model



One of the advantages of using Random forest model has- it provides the importance of variables/features in the data/model. For this Customer retention problem, we are interested in knowing which feature/factor contribute the most in the Attrition and RF's one function can give us this information.

Heat Map



- There are many continuous variables, we can have a look at their distribution and create a grid of pair plots but that would be too much code to see the correlation as there are a lot variables.
- Rather, we can create a seaborn heatmap of numeric variables and see the correlation.
- The variables which are not poorly correlated, we will pick those variables and move forward with them and will leave the ones which are strongly related for those whose correlation value is towards one.

Libraries to be used

- Pandas
- Numpy
- Scikit Learn

Tentative Model

jupyter SironLabsTesting-Copy3 Last Checkpoint: Last Wednesday at 9:20 PM (autosaved)

Logout

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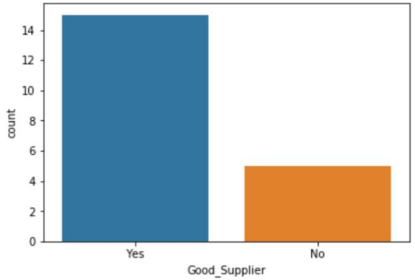
Trusted | Python 2

Run Code

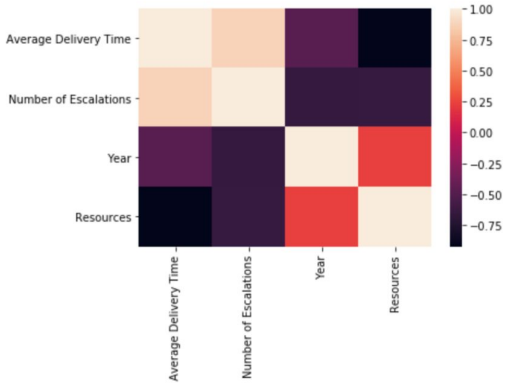
In [41]:
```
sns.countplot(supplier_data['Good_Supplier'])
```

Out[41]: <matplotlib.axes._subplots.AxesSubplot at 0x12a6d1310>

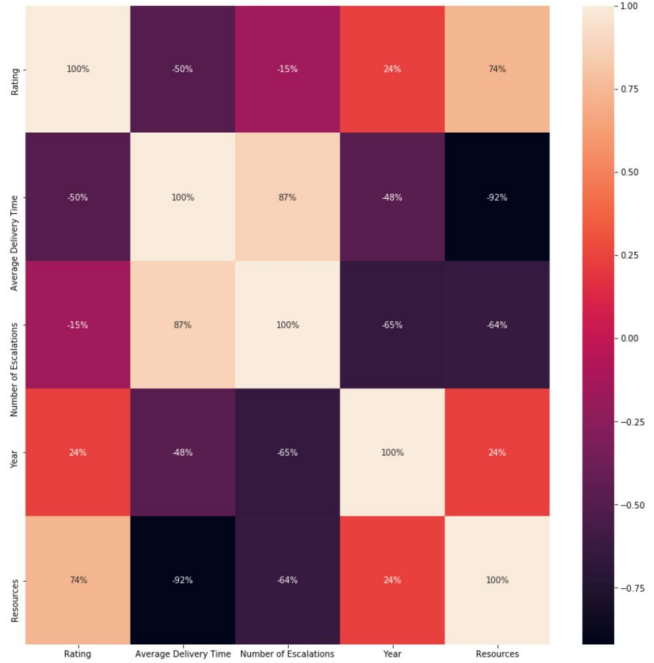


In [42]:
```
sns.heatmap(supplier_data_num.corr())
```

Out[42]: <matplotlib.axes._subplots.AxesSubplot at 0x12a73d710>



Out[21]: <matplotlib.axes._subplots.AxesSubplot at 0x129e93ad0>



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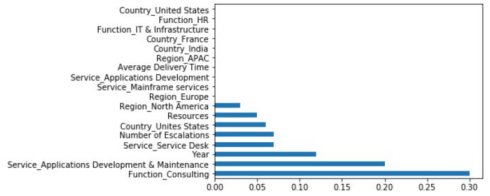
Run Code

```
from numpy.core.umath_tests import inner1d
```

In [27]:
```
# Return the feature importances (the higher, the more important the feature).
feat_importances = pd.Series(model.feature_importances_, index=features.columns)
feat_importances = feat_importances.nlargest(20)
feat_importances
```

Out[27]:
```
Function_Consulting                          0.30
Service_Applications Development & Maintenance    0.20
Year                                         0.12
Service_Service Desk                         0.07
Number of Escalations                        0.07
Country_Unites States                        0.06
Resources                                    0.05
Region_North America                         0.03
Region_Europe                                0.00
Service_Mainframe services                   0.00
Service_Applications Development             0.00
Average Delivery Time                        0.00
Region_APAC                                  0.00
Country_India                                0.00
Country_France                               0.00
Function_IT & Infrastructure                 0.00
Function_HR                                  0.00
Country_United States                        0.00
dtype: float64
```

In [28]:
```
feat_importances.plot(kind='barh')
warnings.filterwarnings("ignore")
```



In [ ]:

Business Model

Model Details

Customer Grade	Advertising Cost	Supplier Satisfaction	Cost (based on 2 parameters)
Grade 1 (new supplier)	10% of TS	Rating : 1 (10% of TS)	20% of CG
Grade 2 (mid-level)	20% of TS	Rating : 1 (20% of TS)	30% of CG
Grade 3 (most valued supplier)	30% of TS	Rating : 1 (30% of TS)	70% of CG

Attrition Cost

Attrition cost is pre-calculated based on customer Grade eg: Current Spend, Present frequency rating, Years as customer, etc. and customer satisfaction.

TS-Total Spend as customer till date

CG-Supplier Grade

Rating-Scale: 1:Being worst, 3 being best

The better the rating the lesser the attrition cost.

Supplier with high CG rate will result in higher attrition cost

Model Details

Risk Assessment

- Based on service satisfaction questionnaires, customers are placed into 3 buckets on the attrition probability scale - High, Medium & Low
- The sumproduct of the probabilities and the attrition cost of customers gives **Most Probable Attrition Cost (MPAC)** to the company
- The MPAC is calculated at a regional and grade level
- On further data analysis, the areas / departments with greater high risk supplier or higher percentage of **MPAC / CTC** are analysed and corrective action is suggested based on findings from attrition reasoning & team demographics

Model Details

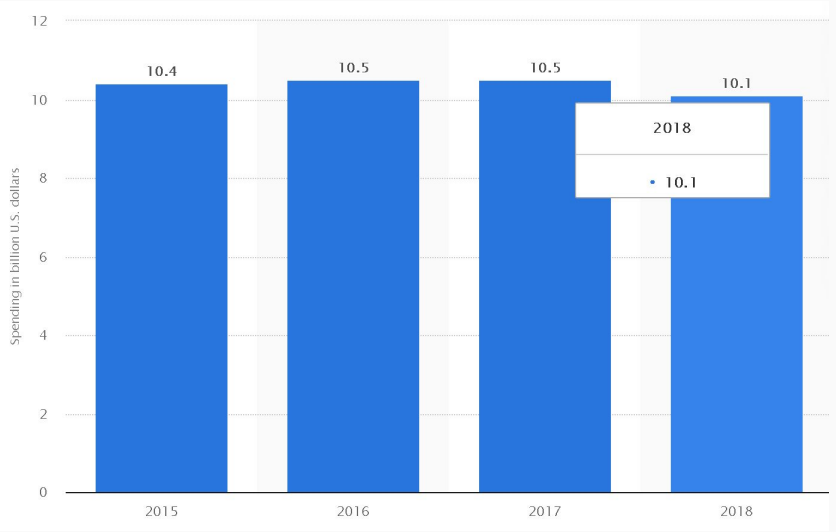
Measurable results

- Indices like MPAC and MPAC / CTC ratio point to the direction of maximum risk
- The model then suggest the common issues among high risk customer for the management to take corrective actions
- The model also suggests the budget that can be spent for these corrective by means of calculative analysis of the cost of reducing the attrition cost
- This targeted preventive action towards slowing the Churn rate & save a company a major chunk of the attrition cost, and ofcourse, its customer base

Conclusions

Supplier Retention

- Improving systems using meaningful data , the same can be further improved.
- By adding supplier turnover and cost-to-retain into the planning we can now calculate with pretty accurate costs to maintain a certain position.
- We can also identify with the given model which departments needs to ramp up their efforts in keeping customers and start taking actions accordingly.



About Presenter

Shruti Gupta

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Developer by profession having hands on experience in handling a project from idea to development along with maintenance. Worked as a full stack developer gaining knowledge in front and back end technologies.

Interested in Intrepreneurship, worked for many startups.

Tech Stack: AngularJS, Python-Django, PostgreSQL

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