Capstone Project Weekly Progress Report

Semester	Fall 2021
Course Code	AML 3406
Section	Section 2
Project Title	Restaurant Recommending Chatbot
Group Name	Group 3
Student names/Student IDs	Vignesh Kumar Murugananthan C0793760
Reporting Week	Week 6– 10/16/2021
Faculty Supervisor	Vahid Hadavi

1. **Tasks Outlined in Previous Weekly Progress Report**
   - Analyzed Business data and Review data
   - Explored the data to find various insights in them by exploratory data analysis
   - Grouped data based on the restaurant category and visualized them in order to understand how the data is represented.

2. **Progress Made in Reporting Week**
   - Firstly, we have split the train and test data sets with a composition of 80 and 20 percent respectively.
   - Then we have analyzed few algorithms with our train data.
   - The algorithms we used in our model building are:
     Logistic regression, Decision tree classifier, KNN, Random Forest, and Gradient boost.

```
#importing libraries of machine learning algorithm
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.ensemble import GradientBoostingClassifier
from sklearn.naive_bayes import MultinomialNB

#importing libararies for selecting model
from sklearn.model_selection import cross_val_score
from sklearn.multiclass import OneVsRestClassifier
```

   - After modeling we have made the confusion matrix, which is one of the important metrics in classification algorithms.

```
log = LogisticRegression(solver='liblinear',max_iter=10000)
knn = KNeighborsClassifier()
nb = MultinomialNB()
XGB = GradientBoostingClassifier()
dec_tree = DecisionTreeClassifier()
forest = RandomForestClassifier()

models = [('LR', log),
          ('KNN',knn),
          ('XGB',XGB),
          ('NB',nb),
          ('Decision Tree',dec_tree),
          ('Random Forest',forest)]
```

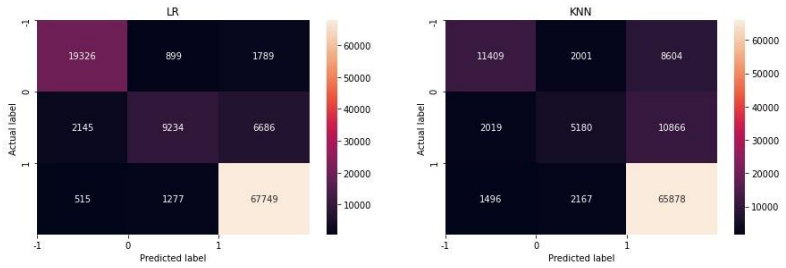
- With all the above given algorithms, we also used randomized search CV with Logistic regression to get the best parameters. With those parameters we have achieved accurate scores.

```
# Train all models
for name, model in models:
    now = datetime.now()
    print(f'{name} training started at {now.strftime("%H:%M:%S")}')
    model.fit(train_data,train_label)
    now = datetime.now()
    print(f'{name} training completed at {now.strftime("%H:%M:%S")}')
```

```
LR training started at 17:06:56
LR training completed at 17:10:40
KNN training started at 17:10:40
KNN training completed at 17:10:40
XGB training started at 17:10:40
XGB training completed at 17:15:37
NB training started at 17:15:37
NB training completed at 17:15:37
Decision Tree training started at 17:15:37
Decision Tree training completed at 17:20:05
Random Forest training started at 17:20:05
Random Forest training completed at 17:30:33
```

```
# Import confusion matrix
from sklearn.metrics import confusion_matrix

plt.figure(figsize=(15,15))
for i, model in enumerate(models):
    plt.subplot(3,2,i+1)
    y_predict = model[1].predict(train_data)
    cmatrix = confusion_matrix(train_label,y_predict)
    class_names=['-1','0','1'] # name  of classes
    # create heatmap
    sns.heatmap(pd.DataFrame(cmatrix, columns=class_names), annot=True, fmt='g')
    plt.title(model[0])
    plt.xticks(range(3),['-1','0','1'])
    plt.yticks(range(3),['-1','0','1'])
    plt.ylabel('Actual label')
    plt.xlabel('Predicted label')
plt.show()
```



	Name	F1 Mean	F1 STD	Accuracy Mean	Accuracy STD
0	LR	0.782199	0.002640	0.799316	0.002195
3	NB	0.772098	0.003115	0.774238	0.003062
2	XGB	0.711712	0.003057	0.751095	0.002098
5	Random Forest	0.679467	0.002069	0.748741	0.001590
4	Decision Tree	0.669946	0.004161	0.674849	0.004558
1	KNN	0.613156	0.003652	0.657535	0.003702

```
# Import RandomnsearchCV
from sklearn.model_selection import RandomizedSearchCV
from sklearn.linear_model import LogisticRegression

lr_classifier = LogisticRegression(max_iter=1000)

param_distributions = {'solver': ['newton-cg','lbfgs','liblinear','sag','saga'],
              'C': [100, 10, 1.0, 0.1, 0.01]}

random_search = RandomizedSearchCV(lr_classifier,
                        param_distributions=param_distributions,
                        scoring='f1_weighted',
                        cv=10,
                        verbose=10,
                        n_jobs=-1)

random_search.fit(train_data, train_label)
lr_opt = random_search.best_estimator_
```

```
[CV 1/10; 10/10] END ................C=1.0, solver=newton-cg; total time= 3.1min
[CV 2/10; 10/10] START C=1.0, solver=newton-cg.................................
[CV 2/10; 10/10] END ................C=1.0, solver=newton-cg; total time= 3.0min
[CV 3/10; 10/10] START C=1.0, solver=newton-cg.................................
[CV 3/10; 10/10] END ................C=1.0, solver=newton-cg; total time= 3.1min
[CV 4/10; 10/10] START C=1.0, solver=newton-cg.................................
[CV 4/10; 10/10] END ................C=1.0, solver=newton-cg; total time= 3.2min
[CV 5/10; 10/10] START C=1.0, solver=newton-cg.................................
[CV 5/10; 10/10] END ................C=1.0, solver=newton-cg; total time= 3.3min
[CV 6/10; 10/10] START C=1.0, solver=newton-cg.................................
[CV 6/10; 10/10] END ................C=1.0, solver=newton-cg; total time= 3.0min
[CV 7/10; 10/10] START C=1.0, solver=newton-cg.................................
[CV 7/10; 10/10] END ................C=1.0, solver=newton-cg; total time= 3.0min
[CV 8/10; 10/10] START C=1.0, solver=newton-cg.................................
[CV 8/10; 10/10] END ................C=1.0, solver=newton-cg; total time= 3.1min
[CV 9/10; 10/10] START C=1.0, solver=newton-cg.................................
[CV 9/10; 10/10] END ................C=1.0, solver=newton-cg; total time= 3.4min
[CV 10/10; 10/10] START C=1.0, solver=newton-cg................................
[CV 10/10; 10/10] END ................C=1.0, solver=newton-cg; total time= 3.3min
```

```
print('='*50)
print("best params: " + str(random_search.best_params_))
print('best score:', random_search.best_score_)
print('='*50)
```

```
==================================================
best params: {'solver': 'newton-cg', 'C': 0.1}
best score: 0.7886700289213612
==================================================
```

3. Difficulties Encountered in Reporting Week

- We faced issues with SQL server database and also with Azure server which we are currently analyzing to fix it.

4. Tasks to Be Completed in Next Week

- Model evaluation with the test data
- The evaluation includes sentiment analysis like finding stop words, stemming (porter stemmer), Word tokenizing, and Visualization
- Cosine similarity
- Chatbot building

Overall Project Plan:

Restaurant Recommending Chatbot

TASK NAME	RESPONSIBLE	START	FINISH	DURATION (DAYS)	STATUS
Project Proposal					
Case study Analysis	Team	18-Sep	23-Sep	5	In Progress
Requirements Documentation	Vignesh/Murali	18-Sep	23-Sep	5	In Progress
Presentation Slides	Swathi	18-Sep	23-Sep	5	In Progress
Requirements Gathering					
SW Environment Setup	Team	23-Sep	1-Oct	8	Not Started
Data acquition - Scrapy, Twitter API	Vignesh/Varadha	23-Sep	1-Oct	8	Not Started
Requirement Analysis	Swathi	23-Sep	1-Oct	8	Not Started
Documentation	Swathi/Murali	23-Sep	1-Oct	8	Not Started
Development Phase I					
Model building	Vignesh/Murali	1-Oct	22-Oct	21	Not Started
NLP	Varadha	1-Oct	22-Oct	21	Not Started
Development Phase II					
Webapp Building	Swathi	23-Oct	12-Nov	20	Not Started
Buffer	Team	23-Oct	12-Nov	20	Not Started
Testing Phase I					
Unit Testing	Murali	13-Nov	19-Nov	6	Not Started
Integration Testing	Swathi	20-Nov	26-Nov	6	Not Started
Testing Phase II					
Functional Testing	varadha/murali	26-Nov	4-Dec	8	Not Started
Performance Testing	vignesh/swathi	5-Dec	13-Dec	8	Not Started
Final Presentation					
Report Generation/Documentation	Swathi/Murali	13-Dec	15-Dec	2	Not Started
Slides data collection	Varadha/vignesh	15-Dec	16-Dec	1	Not Started
Finalize Presentation	Team	16-Dec	17-Dec	1	Not Started
Approve Presentation	Team	17-Dec	18-Dec	1	Not Started

STATUS
Complete
Overdue
In Progress
Not Started

Individual Project plan:

Case study analysis

S/W environment setup

Development phase 1 – NLP

Development Phase 2 – Webapp Building

Testing Phase 2 – UNIT and Integration testing

HIGLIGHTED BELOW ARE MY RESPONSIBILITIES

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