vii.

* Assumptions:

1. Each restaurant has one feature in each category. If multiple features are found, the last one was chosen.
2. Any of the features that contain European geographical information are considered “Europe continent” and the restaurants are included.
3. Weka is used to determine the city based on the features. NaiveBayes and J48 methods are employed.

* Results:

=== Run information ===

Scheme:weka.classifiers.bayes.NaiveBayes

Relation: Europe-city

Instances: 896

Attributes: 5

atmosphere

style

price

occasion

city

Test mode:10-fold cross-validation

=== Classifier model (full training set) ===

Naive Bayes Classifier

Class

Attribute atlanta boston chicago los\_angeles new\_orleans new\_york san\_francisco washington\_dc

(0.02) (0.03) (0.26) (0.12) (0.05) (0.45) (0.01) (0.06)

=====================================================================================================================================================

atmosphere

An Historic Spot 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

An Out Of The Way Find 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Authentic 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Buffet Dining 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Business Scene 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

CafeGarden Dining 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Classic Hotel Dining 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Creative 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Credit cards are not accepted 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Excellent Decor 10.0 3.0 90.0 56.0 10.0 161.0 4.0 31.0

Excellent Food 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Excellent Service 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Extraordinary Decor 6.0 3.0 33.0 10.0 7.0 36.0 2.0 9.0

Extraordinary Food 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Extraordinary Service 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Fabulous Views 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Fabulous Wine Lists 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Fair Decor 3.0 3.0 15.0 5.0 8.0 24.0 1.0 2.0

Fair Food 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Fair Service 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Focus on Dessert 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

For the Young and Young at Heart 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Good Decor 3.0 17.0 94.0 35.0 25.0 178.0 5.0 17.0

Good Food 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Good Out of Town Business 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Good Service 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Good for Younger Kids 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Great for People Watching 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Health Conscious Menus 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Hip Place To Be 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Little Known But Well Liked 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Near-perfect Decor 1.0 1.0 4.0 2.0 1.0 15.0 1.0 2.0

Near-perfect Food 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Near-perfect Service 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Need To Dress 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

No Liquor Served 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

No Reservations 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

No Smoking Allowed 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Old World Cafe Charm 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

On the Beach 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

ParkingValet 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

People Keep Coming Back 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Place for Singles 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Poor Decor 1.0 2.0 1.0 2.0 1.0 2.0 1.0 1.0

Pub Feel 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Quiet for Conversation 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Quirky 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Relaxed Senior Scene 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Romantic 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Singles Scene 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Tourist Appeal 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Up and Coming 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Very Busy - Reservations a Must 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Warm spots by the fire 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Wheelchair Access 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

[total] 73.0 78.0 286.0 159.0 101.0 465.0 63.0 111.0

style

A 1.0 3.0 1.0 1.0 1.0 1.0 1.0 1.0

Southern 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

French 10.0 1.0 16.0 1.0 1.0 40.0 1.0 1.0

Japanese 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Southwestern 1.0 1.0 1.0 1.0 1.0 1.0 1.0 3.0

Swiss 2.0 1.0 1.0 1.0 1.0 5.0 1.0 1.0

Asian 1.0 1.0 2.0 1.0 1.0 1.0 1.0 1.0

Southeast Asian 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

International 1.0 2.0 1.0 1.0 1.0 1.0 1.0 1.0

Southern Comfort 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Deli 1.0 1.0 1.0 1.0 1.0 1.0 1.0 2.0

Kosher 1.0 1.0 1.0 2.0 1.0 1.0 1.0 1.0

Afghanistan 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Argentinean 1.0 1.0 1.0 1.0 1.0 2.0 1.0 1.0

Eclectic 1.0 1.0 2.0 1.0 1.0 1.0 1.0 1.0

Continental 2.0 2.0 4.0 3.0 1.0 4.0 2.0 1.0

Bakeries 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Belgian 1.0 1.0 1.0 1.0 1.0 2.0 1.0 1.0

Brasserie 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Cab 1.0 1.0 57.0 2.0 1.0 5.0 1.0 1.0

CafeEspresso Bars 1.0 1.0 1.0 2.0 1.0 1.0 1.0 1.0

Cafeterias 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Californian 1.0 1.0 1.0 6.0 1.0 1.0 1.0 1.0

Wine and Beer 1.0 1.0 1.0 2.0 1.0 1.0 1.0 3.0

Carry in Wine and Beer 1.0 2.0 6.0 1.0 1.0 1.0 1.0 1.0

Caviar 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Central 1.0 1.0 1.0 2.0 1.0 1.0 1.0 1.0

Coffee Houses 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Coffee Shops 1.0 1.0 1.0 1.0 1.0 4.0 1.0 1.0

Coffeehouses 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Czech 1.0 1.0 3.0 1.0 1.0 2.0 1.0 1.0

Diners 1.0 1.0 2.0 1.0 1.0 2.0 1.0 1.0

Down-Home 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Eastern European 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Egyptian 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

English 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Fast Food 1.0 1.0 1.0 2.0 1.0 1.0 1.0 1.0

Fondue 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Franco-Russian 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Frankfurters 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

French-Japanese 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Grills 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Guatemalan 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Hamburgers 1.0 1.0 1.0 1.0 1.0 1.0 1.0 2.0

Health Food 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

High Tea 1.0 1.0 1.0 1.0 1.0 2.0 1.0 1.0

Jewish 1.0 1.0 1.0 1.0 1.0 6.0 1.0 1.0

Latin 1.0 1.0 1.0 1.0 1.0 1.0 1.0 2.0

Lithuanian 1.0 1.0 3.0 1.0 1.0 1.0 1.0 1.0

Middle Eastern 1.0 4.0 1.0 1.0 1.0 2.0 2.0 1.0

N 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Nicaraguan 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Noodle Houses 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Noodle Shops 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Omelettes 1.0 1.0 1.0 1.0 1.0 2.0 1.0 1.0

Oyster Bars 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Pancakes 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Pastries 1.0 1.0 1.0 1.0 1.0 2.0 1.0 1.0

Pastry Shops 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Pizza 1.0 1.0 22.0 1.0 3.0 15.0 1.0 17.0

Pizzerias 1.0 1.0 1.0 5.0 1.0 1.0 1.0 1.0

Po Boys 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Power Brokers 1.0 2.0 11.0 7.0 1.0 8.0 1.0 2.0

Roumanian 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Russian 1.0 1.0 1.0 1.0 1.0 4.0 1.0 1.0

Salvadoran 1.0 1.0 1.0 1.0 1.0 1.0 1.0 2.0

Scottish 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Soul Food 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Soulfood 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Steakhouses 1.0 1.0 3.0 1.0 1.0 5.0 1.0 1.0

Swiss-French 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Tacos 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Traditional 2.0 3.0 16.0 7.0 3.0 28.0 1.0 5.0

Ukrainian 1.0 1.0 1.0 1.0 1.0 3.0 1.0 1.0

Ukranian 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Venezuelan 1.0 1.0 1.0 1.0 1.0 2.0 1.0 1.0

Yogurt Bar 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Yugoslavian 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

[total] 90.0 89.0 212.0 107.0 82.0 202.0 80.0 107.0

price

15-30 14.0 16.0 186.0 86.0 37.0 186.0 9.0 50.0

30-50 4.0 2.0 22.0 17.0 2.0 187.0 1.0 3.0

below 15 3.0 8.0 24.0 4.0 10.0 10.0 1.0 6.0

over 50 1.0 1.0 3.0 1.0 1.0 31.0 1.0 1.0

[total] 22.0 27.0 235.0 108.0 50.0 414.0 12.0 60.0

occasion

Game 1.0 4.0 1.0 1.0 3.0 21.0 1.0 1.0

After Hours Dining 1.0 1.0 1.0 2.0 1.0 1.0 1.0 1.0

Catering for Special Events 11.0 2.0 3.0 1.0 1.0 1.0 3.0 9.0

Dancing 2.0 2.0 1.0 5.0 1.0 1.0 1.0 1.0

Delivery Available 2.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Dining After the Theater 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Dining Outdoors 2.0 1.0 24.0 10.0 2.0 38.0 2.0 7.0

Early Dining 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Entertainment 5.0 4.0 14.0 16.0 4.0 32.0 2.0 6.0

Fine for Dining Alone 1.0 2.0 1.0 1.0 4.0 10.0 1.0 1.0

Great Place to Meet for a Drink 1.0 1.0 1.0 1.0 1.0 3.0 1.0 1.0

Happy Hour 1.0 2.0 1.0 1.0 1.0 1.0 1.0 1.0

Late Night Menu 1.0 3.0 4.0 6.0 5.0 36.0 1.0 1.0

Long Drive 1.0 1.0 14.0 1.0 1.0 1.0 1.0 1.0

Margaritas 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Menus in Braille 1.0 1.0 1.0 1.0 1.0 5.0 1.0 1.0

Open for Breakfast 1.0 3.0 2.0 5.0 2.0 8.0 2.0 3.0

Open on Mondays 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Open on Sundays 1.0 1.0 1.0 1.0 11.0 1.0 1.0 1.0

Other Quick Food 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Parties and Occasions 1.0 1.0 1.0 3.0 1.0 1.0 1.0 1.0

Picnics 1.0 1.0 1.0 6.0 1.0 1.0 1.0 1.0

Pre-theater Dining 1.0 1.0 1.0 2.0 1.0 3.0 1.0 1.0

Private Parties 1.0 4.0 1.0 1.0 10.0 1.0 1.0 1.0

Private Rooms Available 2.0 1.0 48.0 13.0 5.0 10.0 2.0 4.0

Prix Fixe Menus 1.0 1.0 5.0 1.0 1.0 26.0 1.0 2.0

See the Game 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0

Short Drive 1.0 1.0 11.0 1.0 1.0 2.0 1.0 1.0

Special Brunch Menu 1.0 1.0 1.0 1.0 3.0 16.0 1.0 13.0

Takeout Available 1.0 2.0 7.0 1.0 1.0 29.0 1.0 10.0

Walk 1.0 1.0 7.0 1.0 1.0 1.0 1.0 1.0

Weekend Brunch 1.0 1.0 89.0 27.0 1.0 1.0 1.0 1.0

Weekend Dining 1.0 4.0 1.0 1.0 1.0 16.0 3.0 4.0

Weekend Jazz Brunch 1.0 1.0 1.0 14.0 1.0 1.0 1.0 1.0

Weekend Lunch 1.0 1.0 1.0 4.0 1.0 1.0 1.0 6.0

[total] 53.0 56.0 251.0 135.0 74.0 275.0 43.0 89.0

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 620 69.1964 %

Incorrectly Classified Instances 276 30.8036 %

Kappa statistic 0.5134

Mean absolute error 0.1086

Root mean squared error 0.2384

Relative absolute error 61.6621 %

Root relative squared error 80.419 %

Total Number of Instances 896

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure ROC Area Class

0 0.001 0 0 0 0.851 atlanta

0 0.001 0 0 0 0.832 boston

0.805 0.125 0.691 0.805 0.744 0.901 chicago

0.221 0.004 0.885 0.221 0.354 0.849 los\_angeles

0.37 0.011 0.654 0.37 0.472 0.865 new\_orleans

0.937 0.352 0.692 0.937 0.796 0.872 new\_york

0 0 0 0 0 0.682 san\_francisco

0.179 0.01 0.556 0.179 0.27 0.874 washington\_dc

Weighted Avg. 0.692 0.195 0.666 0.692 0.638 0.873

=== Confusion Matrix ===

a b c d e f g h <-- classified as

0 0 7 1 0 9 0 1 | a = atlanta

0 0 4 0 4 15 0 0 | b = boston

1 0 186 0 1 42 0 1 | c = chicago

0 1 36 23 0 41 0 3 | d = los\_angeles

0 0 6 0 17 23 0 0 | e = new\_orleans

0 0 21 0 4 384 0 1 | f = new\_york

0 0 1 0 0 5 0 2 | g = san\_francisco

0 0 8 2 0 36 0 10 | h = washington\_dc

=== Run information ===

Scheme:weka.classifiers.trees.J48 -C 0.25 -M 2

Relation: Europe-city

Instances: 896

Attributes: 5

atmosphere

style

price

occasion

city

Test mode:10-fold cross-validation

=== Classifier model (full training set) ===

J48 pruned tree

------------------

occasion = Game: new\_york (32.18/6.08)

occasion = After Hours Dining: los\_angeles (1.29/0.28)

occasion = Catering for Special Events

| style = A: boston (0.06/0.03)

| style = Southern: atlanta (0.0)

| style = French: atlanta (10.82/3.72)

| style = Japanese: atlanta (0.0)

| style = Southwestern: atlanta (0.0)

| style = Swiss: new\_york (0.12/0.03)

| style = Asian: atlanta (0.0)

| style = Southeast Asian: atlanta (0.0)

| style = International: atlanta (0.0)

| style = Southern Comfort: atlanta (0.0)

| style = Deli: atlanta (0.0)

| style = Kosher: atlanta (0.0)

| style = Afghanistan: atlanta (0.0)

| style = Argentinean: new\_york (0.06/0.02)

| style = Eclectic: atlanta (0.0)

| style = Continental: boston (1.88/0.88)

| style = Bakeries: atlanta (0.0)

| style = Belgian: atlanta (0.0)

| style = Brasserie: atlanta (0.0)

| style = Cab: chicago (0.76/0.31)

| style = CafeEspresso Bars: atlanta (0.0)

| style = Cafeterias: atlanta (0.0)

| style = Californian: atlanta (0.0)

| style = Wine and Beer: washington\_dc (1.76/0.7)

| style = Carry in Wine and Beer: atlanta (0.0)

| style = Caviar: atlanta (0.0)

| style = Central: atlanta (0.0)

| style = Coffee Houses: atlanta (0.0)

| style = Coffee Shops: new\_york (0.06/0.02)

| style = Coffeehouses: atlanta (0.0)

| style = Czech: new\_york (0.06/0.02)

| style = Diners: atlanta (0.0)

| style = Down-Home: atlanta (0.0)

| style = Eastern European: atlanta (0.0)

| style = Egyptian: atlanta (0.0)

| style = English: atlanta (0.0)

| style = Fast Food: atlanta (0.0)

| style = Fondue: atlanta (0.0)

| style = Franco-Russian: atlanta (0.0)

| style = Frankfurters: atlanta (0.0)

| style = French-Japanese: atlanta (0.0)

| style = Grills: atlanta (0.0)

| style = Guatemalan: atlanta (0.0)

| style = Hamburgers: atlanta (0.0)

| style = Health Food: atlanta (0.0)

| style = High Tea: new\_york (0.06/0.02)

| style = Jewish: new\_york (0.12/0.03)

| style = Latin: washington\_dc (1.76/0.7)

| style = Lithuanian: atlanta (0.0)

| style = Middle Eastern: atlanta (0.0)

| style = N: atlanta (0.0)

| style = Nicaraguan: atlanta (0.0)

| style = Noodle Houses: atlanta (0.0)

| style = Noodle Shops: atlanta (0.0)

| style = Omelettes: atlanta (0.0)

| style = Oyster Bars: atlanta (0.0)

| style = Pancakes: atlanta (0.0)

| style = Pastries: atlanta (0.0)

| style = Pastry Shops: atlanta (0.0)

| style = Pizza: washington\_dc (7.29/3.03)

| style = Pizzerias: atlanta (0.0)

| style = Po Boys: atlanta (0.0)

| style = Power Brokers: washington\_dc (2.0/0.93)

| style = Roumanian: atlanta (0.0)

| style = Russian: new\_york (0.06/0.02)

| style = Salvadoran: atlanta (0.0)

| style = Scottish: atlanta (0.0)

| style = Soul Food: atlanta (0.0)

| style = Soulfood: atlanta (0.0)

| style = Steakhouses: atlanta (0.0)

| style = Swiss-French: atlanta (0.0)

| style = Tacos: atlanta (0.0)

| style = Traditional: atlanta (2.76/1.48)

| style = Ukrainian: atlanta (0.0)

| style = Ukranian: atlanta (0.0)

| style = Venezuelan: atlanta (0.0)

| style = Yogurt Bar: atlanta (0.0)

| style = Yugoslavian: atlanta (0.0)

occasion = Dancing: los\_angeles (7.72/3.69)

occasion = Delivery Available: atlanta (1.29/0.29)

occasion = Dining After the Theater: new\_york (0.0)

occasion = Dining Outdoors: new\_york (100.41/44.36)

occasion = Early Dining: new\_york (0.0)

occasion = Entertainment: new\_york (96.55/47.23)

occasion = Fine for Dining Alone: new\_york (16.74/4.56)

occasion = Great Place to Meet for a Drink: new\_york (2.57/0.09)

occasion = Happy Hour: boston (1.29/0.28)

occasion = Late Night Menu: new\_york (63.08/16.11)

occasion = Long Drive: chicago (16.74/3.46)

occasion = Margaritas: new\_york (0.0)

occasion = Menus in Braille: new\_york (5.15/0.17)

occasion = Open for Breakfast: new\_york (23.17/11.78)

occasion = Open on Mondays: new\_york (0.0)

occasion = Open on Sundays: new\_orleans (12.87/2.77)

occasion = Other Quick Food: new\_york (0.0)

occasion = Parties and Occasions: los\_angeles (2.57/0.56)

occasion = Picnics: los\_angeles (6.44/1.41)

occasion = Pre-theater Dining: new\_york (3.86/1.13)

occasion = Private Parties

| price = 15-30: new\_orleans (10.93/2.81)

| price = 30-50: new\_york (1.36/0.02)

| price = below 15: boston (3.07/1.05)

| price = over 50: new\_york (0.09)

occasion = Private Rooms Available: chicago (99.13/50.47)

occasion = Prix Fixe Menus: new\_york (38.62/6.29)

occasion = See the Game: new\_york (0.0)

occasion = Short Drive: chicago (14.16/3.92)

occasion = Special Brunch Menu: new\_york (37.33/15.25)

occasion = Takeout Available

| price = 15-30

| | atmosphere = An Historic Spot: new\_york (0.0)

| | atmosphere = An Out Of The Way Find: new\_york (0.0)

| | atmosphere = Authentic: new\_york (0.0)

| | atmosphere = Buffet Dining: new\_york (0.0)

| | atmosphere = Business Scene: new\_york (0.0)

| | atmosphere = CafeGarden Dining: new\_york (0.0)

| | atmosphere = Classic Hotel Dining: new\_york (0.0)

| | atmosphere = Creative: new\_york (0.0)

| | atmosphere = Credit cards are not accepted: new\_york (0.0)

| | atmosphere = Excellent Decor: washington\_dc (7.33/1.26)

| | atmosphere = Excellent Food: new\_york (0.0)

| | atmosphere = Excellent Service: new\_york (0.0)

| | atmosphere = Extraordinary Decor: washington\_dc (3.19/0.19)

| | atmosphere = Extraordinary Food: new\_york (0.0)

| | atmosphere = Extraordinary Service: new\_york (0.0)

| | atmosphere = Fabulous Views: new\_york (0.0)

| | atmosphere = Fabulous Wine Lists: new\_york (0.0)

| | atmosphere = Fair Decor: new\_york (2.57/1.06)

| | atmosphere = Fair Food: new\_york (0.0)

| | atmosphere = Fair Service: new\_york (0.0)

| | atmosphere = Focus on Dessert: new\_york (0.0)

| | atmosphere = For the Young and Young at Heart: new\_york (0.0)

| | atmosphere = Good Decor: new\_york (15.99/3.01)

| | atmosphere = Good Food: new\_york (0.0)

| | atmosphere = Good Out of Town Business: new\_york (0.0)

| | atmosphere = Good Service: new\_york (0.0)

| | atmosphere = Good for Younger Kids: new\_york (0.0)

| | atmosphere = Great for People Watching: new\_york (0.0)

| | atmosphere = Health Conscious Menus: new\_york (0.0)

| | atmosphere = Hip Place To Be: new\_york (0.0)

| | atmosphere = Little Known But Well Liked: new\_york (0.0)

| | atmosphere = Near-perfect Decor: new\_york (0.0)

| | atmosphere = Near-perfect Food: new\_york (0.0)

| | atmosphere = Near-perfect Service: new\_york (0.0)

| | atmosphere = Need To Dress: new\_york (0.0)

| | atmosphere = No Liquor Served: new\_york (0.0)

| | atmosphere = No Reservations: new\_york (0.0)

| | atmosphere = No Smoking Allowed: new\_york (0.0)

| | atmosphere = Old World Cafe Charm: new\_york (0.0)

| | atmosphere = On the Beach: new\_york (0.0)

| | atmosphere = ParkingValet: new\_york (0.0)

| | atmosphere = People Keep Coming Back: new\_york (0.0)

| | atmosphere = Place for Singles: new\_york (0.0)

| | atmosphere = Poor Decor: new\_york (0.0)

| | atmosphere = Pub Feel: new\_york (0.0)

| | atmosphere = Quiet for Conversation: new\_york (0.0)

| | atmosphere = Quirky: new\_york (0.0)

| | atmosphere = Relaxed Senior Scene: new\_york (0.0)

| | atmosphere = Romantic: new\_york (0.0)

| | atmosphere = Singles Scene: new\_york (0.0)

| | atmosphere = Tourist Appeal: new\_york (0.0)

| | atmosphere = Up and Coming: new\_york (0.0)

| | atmosphere = Very Busy - Reservations a Must: new\_york (0.0)

| | atmosphere = Warm spots by the fire: new\_york (0.0)

| | atmosphere = Wheelchair Access: new\_york (0.0)

| price = 30-50: new\_york (21.99/0.06)

| price = below 15: chicago (5.25/1.25)

| price = over 50: new\_york (0.32)

occasion = Walk: chicago (7.72/1.59)

occasion = Weekend Brunch

| price = 15-30: chicago (115.34/39.05)

| price = 30-50: new\_york (16.94/4.16)

| price = below 15: chicago (13.66/1.66)

| price = over 50: new\_york (0.82)

occasion = Weekend Dining: new\_york (29.61/8.99)

occasion = Weekend Jazz Brunch: los\_angeles (16.74/3.66)

occasion = Weekend Lunch: washington\_dc (10.3/5.28)

Number of Leaves : 175

Size of the tree : 181

Time taken to build model: 0.03 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 626 69.8661 %

Incorrectly Classified Instances 270 30.1339 %

Kappa statistic 0.5251

Mean absolute error 0.1273

Root mean squared error 0.248

Relative absolute error 72.2554 %

Root relative squared error 83.6457 %

Total Number of Instances 896

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure ROC Area Class

0.333 0.011 0.375 0.333 0.353 0.806 atlanta

0 0.001 0 0 0 0.705 boston

0.727 0.098 0.721 0.727 0.724 0.865 chicago

0.221 0.01 0.742 0.221 0.341 0.76 los\_angeles

0.391 0.004 0.857 0.391 0.537 0.776 new\_orleans

0.963 0.36 0.693 0.963 0.806 0.83 new\_york

0 0 0 0 0 0.597 san\_francisco

0.286 0.01 0.667 0.286 0.4 0.788 washington\_dc

Weighted Avg. 0.699 0.192 0.682 0.699 0.655 0.82

=== Confusion Matrix ===

a b c d e f g h <-- classified as

6 0 1 1 0 7 0 3 | a = atlanta

1 0 0 1 3 18 0 0 | b = boston

2 0 168 2 0 59 0 0 | c = chicago

0 0 40 23 0 38 0 3 | d = los\_angeles

0 1 4 0 18 23 0 0 | e = new\_orleans

0 0 12 1 0 395 0 2 | f = new\_york

2 0 2 0 0 4 0 0 | g = san\_francisco

5 0 6 3 0 26 0 16 | h = washington\_dc

* Perl code to generate the .arff file:

use strict;

use warnings;

my @europe;

my $european = 'C:/Users/yhan/Documents/CS773/q6/european.txt';

open(my $file5, '<', $european) or die "Could not open file!";

while(<$file5>) {

chomp;

my $line5 = $\_;

push(@europe, $line5);

#print $\_;

}

my $europeans = join(" ", @europe);

my $features = 'C:/Users/yhan/Documents/CS773/q6/features.txt';

open(my $featurefile, '<', $features) or die "Could not open file!";

my %feature;

while (<$featurefile>) {

my $line = $\_;

my ($i, $j) = split(/\t/, $line);

$feature{$i} = $j;

#print "$i is $feature{$i}\n";

}

#open (my $out, '>', 'C:/Users/yhan/Documents/CS773/q7/city.txt');

my $atmosphere = '"An Historic Spot","An Out Of The Way Find","Authentic","Buffet Dining","Business Scene","Cafe/Garden Dining", "Classic Hotel Dining", "Creative", "Credit cards are not accepted", "Excellent Decor", "Excellent Food", "Excellent Service", "Extraordinary Decor", "Extraordinary Food", "Extraordinary Service", "Fabulous Views", "Fabulous Wine Lists", "Fair Decor", "Fair Food", "Fair Service", "Focus on Dessert", "For the Young and Young at Heart", "Good Decor", "Good Food", "Good Out of Town Business", "Good Service", "Good for Younger Kids", "Great for People Watching", "Health Conscious Menus", "Hip Place To Be", "Little Known But Well Liked", "Near-perfect Decor", "Near-perfect Food", "Near-perfect Service", "Need To Dress", "No Liquor Served", "No Reservations", "No Smoking Allowed", "Old World Cafe Charm", "On the Beach", "Parking/Valet", "People Keep Coming Back", "Place for Singles", "Poor Decor", "Pub Feel", "Quiet for Conversation", "Quirky", "Relaxed Senior Scene", "Romantic", "Singles Scene", "Tourist Appeal", "Up and Coming", "Very Busy - Reservations a Must", "Warm spots by the fire", "Wheelchair Access"';

$atmosphere =~ s/[\#@~!&\*()\[\];.:?^`\\\/]+//g;

#printf $out $atmosphere;

my $occasion = '"Game", "After Hours Dining", "Catering for Special Events", "Dancing", "Delivery Available", "Dining After the Theater", "Dining Outdoors", "Early Dining", "Entertainment", "Fine for Dining Alone", "Great Place to Meet for a Drink", "Happy Hour", "Late Night Menu", "Long Drive", "Margaritas", "Menus in Braille", "Open for Breakfast", "Open on Mondays", "Open on Sundays", "Other Quick Food", "Parties and Occasions", "Picnics", "Pre-theater Dining", "Private Parties", "Private Rooms Available", "Prix Fixe Menus", "See the Game", "Short Drive", "Special Brunch Menu", "Takeout Available", "Walk", "Weekend Brunch", "Weekend Dining", "Weekend Jazz Brunch", "Weekend Lunch"';

$occasion =~ s/[\#@~!&\*()\[\];.:?^`\\\/]+//g;

#printf $out $occasion;

my $price = '"$15-$30", "$30-$50", "below $15", "over $50"';

$price =~ s/[\#@~!\$&\*()\[\];.:?^`\\\/]+//g;

#printf $out $price;

my $style = '"A","Southern","Southwestern","Southeast Asian","International","Southern Comfort","Deli","Kosher", "Afghanistan", "Argentinean","Eclectic", "Continental","Bakeries", "Belgian", "Brasserie", "Cab", "Cafe/Espresso Bars", "Cafeterias", "Californian", "Carry in Wine and Beer","Caviar", "Central", "Coffee Houses", "Coffee Shops", "Coffeehouses", "Czech", "Diners", "Down-Home", "Eastern European", "Egyptian", "English", "Fast Food", "Fondue", "Franco-Russian", "Frankfurters", "French-Japanese", "Grills", "Guatemalan", "Hamburgers", "Health Food", "High Tea", "Jewish", "Latin", "Lithuanian", "Middle Eastern", "N", "Nicaraguan", "Noodle Houses", "Noodle Shops", "Omelettes", "Oyster Bars", "Pancakes", "Pastries", "Pastry Shops", "Pizza", "Pizzerias", "Po Boys", "Power Brokers", "Roumanian", "Russian", "Salvadoran", "Scottish", "Soul Food", "Soulfood" , "Steakhouses", "Swiss-French", "Tacos", "Traditional", "Ukrainian", "Ukranian", "Venezuelan", "Yogurt Bar", "Yugoslavian"';

$style =~ s/[\#@~!&\*()\[\];.:?^`\\\/]+//g;

#printf $out $style;

my $dir = 'C:/Users/yhan/Documents/CS773/q7/data';

open (my $out, '>', 'C:/Users/yhan/Documents/CS773/q7/europeCity2.arff');

foreach my $fp (glob("$dir/\*.txt")) {

open my $fh, "<", $fp or die "can't read open '$fp'";

#print $fp;

my $city = (split '\/', $fp)[-1];

$city = substr($city, 0, -4);

#printf $out "\"$city\",";

while (<$fh>) {

chomp;

my $line = $\_;

my @res = split /[\s,\t]/, $line;

my $resatom = '?';

my $resocc = '?';

my $resprice = '?';

my $ressty = '?';

my $resf;

foreach my $ele (@res) {

if (exists $feature{$ele} ) {

$resf = $feature{$ele};

chomp ($resf);

$resf =~ s/[\#@~!\$&\*()\[\];.:?^`\\\/]+//g;

#print $resprice;

if($price =~ /$resf/) {

$resprice = $resf;

}

elsif ($style =~ /$resf/) {

$ressty = $resf;

}

elsif ($atmosphere =~ /$resf/) {

$resatom = $resf;

}

elsif ($occasion =~ /$resf/){

$resocc = $resf;

}

}

}

#print "\"$city\"\n";

printf $out "\"$resatom\",\"$ressty\",\"$resprice\",\"$resocc\",\"$city\"\n";

}

}