R model sample output

CSE 563
Japa Swadia

1. SVM Classification on training set

ASSAULT	LARCENY/THEFT	OTHER OFFENSES
3508	3509	3510
ASSAULT	TRESPASS	LARCENY/THEFT
3511	3512	3513
ASSAULT	ASSAULT	ASSAULT
3514	3515	3516
SUSPICIOUS OCC	VEHICLE THEFT	VEHICLE THEFT
3517	3518	3519
OTHER OFFENSES	LARCENY/THEFT	LARCENY/THEFT
3520	3521	3522
OTHER OFFENSES	OTHER OFFENSES	ASSAULT
3523	3524	3525
LARCENY/THEFT	ASSAULT	ASSAULT
3526	3527	3528
ROBBERY	OTHER OFFENSES	VEHICLE THEFT
3529	3530	3531
LARCENY/THEFT	LARCENY/THEFT	LARCENY/THEFT
3532	3533	3534
OTHER OFFENSES	MISSING PERSON	MISSING PERSON
3535	3536	3537
LARCENY/THEFT	LARCENY/THEFT	LARCENY/THEFT
3538	3539	3540
VEHICLE THEFT	VEHICLE THEFT	LARCENY/THEFT
3541	3542	3543
LARCENY/THEFT	LARCENY/THEFT	LARCENY/THEFT
3544	3545	3546
BURGLARY	LARCENY/THEFT	SUSPICIOUS OCC
3547	3548	3549
NON-CRIMINAL	LARCENY/THEFT	ASSAULT
3550	3551	3552
ASSAULT	LARCENY/THEFT	ASSAULT
3553	3554	3555
NON-CRIMINAL	NON-CRIMINAL	NON-CRIMINAL
3556	3557	3558
MISSING PERSON	MISSING PERSON	VEHICLE THEFT
3559	3560	3561
VEHICLE THEFT	NON-CRIMINAL	LARCENY/THEFT
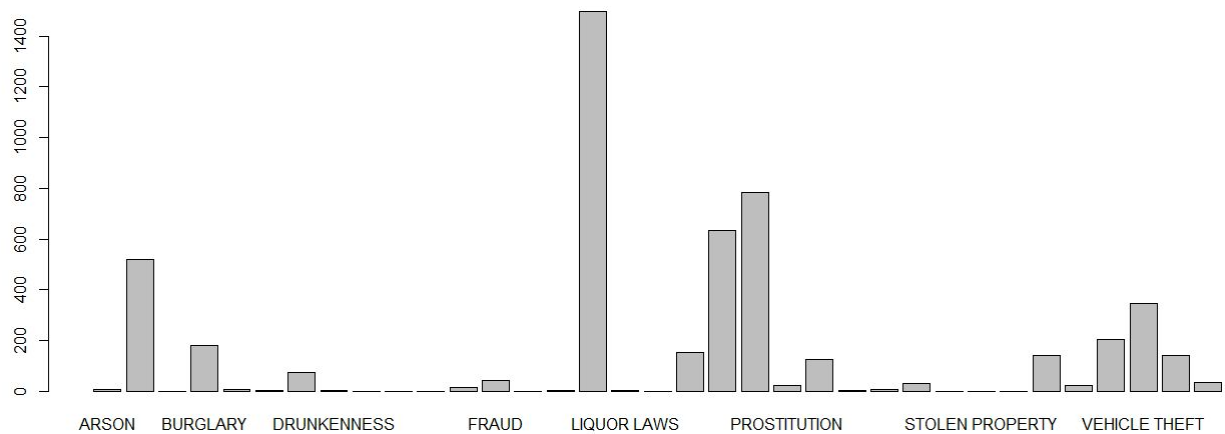
prediction	STOLEN PROPERTY	SUICIDE	SUSPICIOUS OCC	TRESPASS	VANDALISM	VEHICLE THEFT	WARRANTS	WEAPON LAWS
ARSON	0	0	0	0	0	0	0	0
ASSAULT	0	0	7	3	9	0	9	10
BRIBERY	0	0	0	0	0	0	0	0
BURGLARY	1	0	1	1	3	0	0	0
DISORDERLY CONDUCT	0	0	0	1	0	0	0	0
DRIVING UNDER THE INFLUENCE	0	0	0	0	0	0	0	0
DRUG/NARCOTIC	1	0	4	0	0	0	3	2
DRUNKENNESS	0	0	0	0	0	0	0	0
EMBEZZLEMENT	0	0	0	0	0	0	0	0
EXTORTION	0	0	0	0	0	0	0	0
FAMILY OFFENSES	0	0	0	0	0	0	0	0
FORGERY/COUNTERFEITING	0	0	0	0	0	0	0	0
FRAUD	0	0	0	0	0	0	0	0
GAMBLING	0	0	0	0	0	0	0	0
KIDNAPPING	0	0	0	0	0	0	1	0
LARCENY/THEFT	2	0	3	1	20	3	17	2
LIQUOR LAWS	0	0	0	0	0	0	0	0
LOITERING	0	0	0	0	0	0	0	0
MISSING PERSON	0	0	0	0	0	0	0	0
NON-CRIMINAL	1	0	7	1	2	0	8	4
OTHER OFFENSES	12	0	9	2	7	7	41	7
PROSTITUTION	0	0	0	0	0	0	0	0
ROBBERY	0	0	0	0	0	0	1	2
RUNAWAY	0	0	0	0	0	0	0	0
SECONDARY CODES	0	0	0	0	0	0	0	1
SEX OFFENSES FORCIBLE	0	0	0	0	0	0	0	0
SEX OFFENSES NON FORCIBLE	0	0	0	0	0	0	0	0
STOLEN PROPERTY	0	0	0	0	0	0	0	0
SUICIDE	0	1	0	0	0	0	0	0
SUSPICIOUS OCC	0	0	125	2	1	0	1	2
TRESPASS	0	0	0	23	0	0	0	0
VANDALISM	0	0	3	2	180	0	1	0
VEHICLE THEFT	6	0	0	0	2	325	2	0
WARRANTS	0	0	5	3	3	0	110	1
WEAPON LAWS	1	0	0	0	0	0	0	25

prediction

	PROSTITUTION	ROBBERY	RUNAWAY	SECONDARY CODES	SEX OFFENSES FORCIBLE	SEX OFFENSES NON FORCIBLE
ARSON	0	0	0	0	0	0
ASSAULT	0	11	0	19	4	0
BRIBERY	0	0	0	0	0	0
BURGLARY	0	0	0	0	0	0
DISORDERLY CONDUCT	0	0	0	0	0	0
DRIVING UNDER THE INFLUENCE	0	0	0	0	0	0
DRUG/NARCOTIC	1	0	0	2	0	0
DRUNKENNESS	0	0	0	0	0	0
EMBEZZLEMENT	0	0	0	0	0	0
EXTORTION	0	0	0	0	0	0
FAMILY OFFENSES	0	0	0	0	0	0
FORGERY/COUNTERFEITING	0	0	0	0	0	0
FRAUD	0	0	0	1	0	0
GAMBLING	0	0	0	0	0	0
KIDNAPPING	0	0	0	1	0	0
LARCENY/THEFT	0	5	0	7	1	0
LIQUOR LAWS	0	0	0	0	0	0
LOITERING	0	0	0	0	0	0
MISSING PERSON	1	0	2	0	0	0
NON-CRIMINAL	0	0	0	4	4	0
OTHER OFFENSES	2	13	0	13	1	0
PROSTITUTION	19	0	0	0	0	0
ROBBERY	0	108	0	0	1	0
RUNAWAY	0	0	2	0	0	0
SECONDARY CODES	0	1	0	4	0	0
SEX OFFENSES FORCIBLE	0	0	0	0	23	0
SEX OFFENSES NON FORCIBLE	0	0	0	0	0	0
STOLEN PROPERTY	0	0	0	0	0	0
SUICIDE	0	0	0	0	0	0
SUSPICIOUS OCC	0	1	0	5	1	0
TRESPASS	0	0	0	0	0	0
VANDALISM	0	1	0	5	0	0
VEHICLE THEFT	0	0	0	0	0	0
WARRANTS	0	1	0	0	0	0
WEAPON LAWS	0	0	0	1	0	0

prediction

	KIDNAPPING	LARCENY/THEFT	LIQUOR LAWS	LOITERING	MISSING PERSON	NON-CRIMINAL	OTHER OFFENSES
ARSON	0	0	0	0	0	0	0
ASSAULT	11	3	1	0	1	6	17
BRIBERY	0	0	0	0	0	0	0
BURGLARY	0	0	0	0	0	0	2
DISORDERLY CONDUCT	0	0	0	0	0	0	0
DRIVING UNDER THE INFLUENCE	0	0	0	0	0	0	0
DRUG/NARCOTIC	0	0	0	0	0	3	3
DRUNKENNESS	0	0	0	0	0	0	0
EMBEZZLEMENT	0	0	0	0	0	0	0
EXTORTION	0	0	0	0	0	0	0
FAMILY OFFENSES	0	0	0	0	0	0	0
FORGERY/COUNTERFEITING	0	0	0	0	0	0	0
FRAUD	0	1	0	0	0	0	1
GAMBLING	0	0	0	0	0	0	0
KIDNAPPING	3	0	0	0	0	0	0
LARCENY/THEFT	0	1363	0	0	1	8	10
LIQUOR LAWS	0	0	2	0	0	0	0
LOITERING	0	0	0	1	0	0	0
MISSING PERSON	0	0	0	0	145	2	1
NON-CRIMINAL	0	1	1	0	7	571	7
OTHER OFFENSES	3	6	1	1	2	7	555
PROSTITUTION	0	0	0	0	0	0	0
ROBBERY	3	1	0	0	0	1	1
RUNAWAY	0	0	0	0	0	0	0
SECONDARY CODES	0	0	0	0	0	0	0
SEX OFFENSES FORCIBLE	3	0	0	0	0	1	0
SEX OFFENSES NON FORCIBLE	0	0	0	0	0	0	0
STOLEN PROPERTY	0	0	0	0	0	0	0
SUICIDE	0	0	0	0	0	0	0
SUSPICIOUS OCC	0	0	0	0	2	0	0
TRESPASS	0	0	0	0	0	0	0
VANDALISM	1	1	0	0	0	0	2
VEHICLE THEFT	0	3	0	0	0	0	2
WARRANTS	0	0	2	0	0	2	5

prediction	DRUNKENNESS	EMBEZZLEMENT	EXTORTION	FAMILY OFFENSES	FORGERY/COUNTERFEITING	FRAUD	GAMBLING
ARSON	0	0	0	0	0	0	0
ASSAULT	4	0	0	0	0	2	0
BRIBERY	0	0	0	0	0	0	0
BURGLARY	0	0	0	0	0	0	0
DISORDERLY CONDUCT	0	0	0	0	0	0	0
DRIVING UNDER THE INFLUENCE	0	0	0	0	0	0	0
DRUG/NARCOTIC	0	0	0	0	0	1	0
DRUNKENNESS	3	0	0	0	0	0	0
EMBEZZLEMENT	0	0	0	0	0	0	0
EXTORTION	0	0	0	0	0	0	0
FAMILY OFFENSES	0	0	0	0	0	0	0
FORGERY/COUNTERFEITING	0	0	0	0	13	0	0
FRAUD	0	0	0	0	0	40	0
GAMBLING	0	0	0	0	0	0	0
KIDNAPPING	0	0	0	0	0	0	0
LARCENY/THEFT	1	1	0	0	0	27	0
LIQUOR LAWS	0	0	0	0	0	0	0
LOITERING	0	0	0	0	0	0	0
MISSING PERSON	0	0	0	0	0	0	0
NON-CRIMINAL	2	0	0	0	4	5	0
OTHER OFFENSES	4	0	0	0	3	11	0
PROSTITUTION	0	0	0	0	0	0	0
ROBBERY	0	0	0	0	0	2	0
RUNAWAY	0	0	0	0	0	0	0
SECONDARY CODES	0	0	0	0	0	0	0
SEX OFFENSES FORCIBLE	0	0	0	0	0	0	0
SEX OFFENSES NON FORCIBLE	0	0	0	0	0	0	0
STOLEN PROPERTY	0	0	0	0	0	0	0
SUICIDE	0	0	0	0	0	0	0
SUSPICIOUS OCC	1	0	0	0	0	0	0
TRESPASS	0	0	0	0	0	0	0
VANDALISM	3	0	0	0	1	0	0
VEHICLE THEFT	0	0	0	0	0	0	0
WARRANTS	1	0	0	1	0	0	0
WEAPON LAWS	0	0	0	0	0	1	0

prediction	ARSON	ASSAULT	BRIBERY	BURGLARY	DISORDERLY CONDUCT	DRIVING UNDER THE INFLUENCE	DRUG/NARCOTIC
ARSON	7	0	0	0	0	0	0
ASSAULT	1	388	2	5	0	0	6
BRIBERY	0	0	0	0	0	0	0
BURGLARY	0	0	0	170	0	0	2
DISORDERLY CONDUCT	0	0	0	0	5	0	0
DRIVING UNDER THE INFLUENCE	0	0	0	0	0	3	0
DRUG/NARCOTIC	0	0	0	0	0	0	54
DRUNKENNESS	0	0	0	0	0	0	0
EMBEZZLEMENT	0	0	0	0	0	0	0
EXTORTION	0	0	0	0	0	0	0
FAMILY OFFENSES	0	0	0	0	0	0	0
FORGERY/COUNTERFEITING	0	0	0	1	0	0	0
FRAUD	0	0	0	0	0	0	0
GAMBLING	0	0	0	0	0	0	0
KIDNAPPING	0	0	0	0	0	0	0
LARCENY/THEFT	0	10	0	11	0	0	3
LIQUOR LAWS	0	0	0	0	0	0	0
LOITERING	0	0	0	0	0	0	0
MISSING PERSON	0	1	0	0	0	0	0
NON-CRIMINAL	0	2	0	0	0	0	2
OTHER OFFENSES	0	27	1	15	4	5	25
PROSTITUTION	0	0	0	0	1	0	1
ROBBERY	0	3	0	1	0	0	0
RUNAWAY	0	0	0	0	0	0	0
SECONDARY CODES	0	0	0	0	2	0	0
SEX OFFENSES FORCIBLE	0	2	0	0	0	0	0
SEX OFFENSES NON FORCIBLE	0	0	0	0	0	0	0
STOLEN PROPERTY	0	0	0	0	0	0	0
SUICIDE	0	0	0	0	0	0	0
SUSPICIOUS OCC	1	0	0	0	1	0	0
TRESPASS	0	0	0	0	1	0	0
VANDALISM	1	3	0	2	0	0	0
VEHICLE THEFT	0	0	0	2	0	1	2
WARRANTS	0	0	0	0	0	0	8
WEAPON LAWS	0	0	0	0	0	0	3

2. SVM Classification on test set

output.csv

3. Linear regression model 1

```
Call:
lm(formula = DayOfWeek ~ Category, data = reg_test)

Coefficients:
                  (Intercept)              CategoryASSAULT                     CategoryBRIBERY
                    4.0476190                   -0.1003768                          0.0952381
              CategoryBURGLARY     CategoryDISORDERLY CONDUCT    CategoryDRIVING UNDER THE INFLUENCE
                   -0.0003554                    0.3871636                          0.1697723
           CategoryDRUG/NARCOTIC          CategoryDRUNKENNESS               CategoryEMBEZZLEMENT
                    0.2618149                    0.4645761                          0.2857143
             CategoryEXTORTION         CategoryFAMILY OFFENSES     CategoryFORGERY/COUNTERFEITING
                   -3.0476190                   -1.0476190                          0.1685972
                CategoryFRAUD              CategoryGAMBLING                  CategoryKIDNAPPING
                   -0.0045568                   -3.0476190                          0.6190476
          CategoryLARCENY/THEFT            CategoryLIQUOR LAWS                  CategoryLOITERING
                   -0.0057827                    0.2857143                         -0.0476190
         CategoryMISSING PERSON          CategoryNON-CRIMINAL              CategoryOTHER OFFENSES
                   -0.1439646                    0.0959216                          0.1054910
           CategoryPROSTITUTION             CategoryROBBERY                    CategoryRUNAWAY
                    0.8323810                   -0.0172008                          0.8523810
        CategorySECONDARY CODES    CategorySEX OFFENSES FORCIBLE    CategorySEX OFFENSES NON FORCIBLE
                    0.0216117                   -0.1796945                          1.4523810
         CategorySTOLEN PROPERTY            CategorySUICIDE                CategorySUSPICIOUS OCC
                    0.1288515                    0.6190476                          0.1947122
             CategoryTRESPASS            CategoryVANDALISM                  CategoryVEHICLE THEFT
                    0.1102757                    0.0232312                         -0.0507937
             CategoryWARRANTS             CategoryWEAPON LAWS
                   -0.0085565                   -0.3559524
```

4. Linear regression model 2

```
Call:
lm(formula = Category ~ DayOfWeek, data = train_data)

Coefficients:
        (Intercept)   DayOfweekMonday   DayOfweekSaturday   DayOfweekSunday   DayOfweekThursday   DayOfweekTuesday
            16.3578            1.2599             1.0218            0.5190             0.8881             0.2130
DayOfweekWednesday
             0.7995
```

```
                                                    Estimate Std. Error   t value Pr(>|t|)
(Intercept)                                         2.015e+03 4.130e-11 4.879e+13  <2e-16 ***
train_data$CategoryASSAULT                         -1.857e-22 4.177e-11 0.000e+00   1.000
train_data$CategoryBRIBERY                         -1.817e-22 8.597e-11 0.000e+00   1.000
train_data$CategoryBURGLARY                        -1.871e-22 4.228e-11 0.000e+00   1.000
train_data$CategoryDISORDERLY CONDUCT              -1.960e-22 5.407e-11 0.000e+00   1.000
train_data$CategoryDRIVING UNDER THE INFLUENCE     -1.919e-22 6.000e-11 0.000e+00   1.000
train_data$CategoryDRUG/NARCOTIC                   -1.874e-22 4.320e-11 0.000e+00   1.000
train_data$CategoryDRUNKENNESS                     -1.908e-22 5.102e-11 0.000e+00   1.000
train_data$CategoryEMBEZZLEMENT                    -2.077e-22 1.370e-10 0.000e+00   1.000
train_data$CategoryFAMILY OFFENSES                 -1.712e-22 1.370e-10 0.000e+00   1.000
train_data$CategoryFORGERY/COUNTERFEITING          -1.784e-22 5.018e-11 0.000e+00   1.000
train_data$CategoryFRAUD                           -1.868e-22 4.356e-11 0.000e+00   1.000
train_data$CategoryKIDNAPPING                      -1.814e-22 4.915e-11 0.000e+00   1.000
train_data$CategoryLARCENY/THEFT                   -1.859e-22 4.145e-11 0.000e+00   1.000
train_data$CategoryLIQUOR LAWS                     -1.708e-22 6.436e-11 0.000e+00   1.000
train_data$CategoryLOITERING                       -1.627e-22 1.012e-10 0.000e+00   1.000
train_data$CategoryMISSING PERSON                  -1.873e-22 4.258e-11 0.000e+00   1.000
train_data$CategoryNON-CRIMINAL                    -1.884e-22 4.164e-11 0.000e+00   1.000
train_data$CategoryOTHER OFFENSES                  -1.883e-22 4.164e-11 0.000e+00   1.000
train_data$CategoryPROSTITUTION                    -1.836e-22 4.947e-11 0.000e+00   1.000
train_data$CategoryROBBERY                         -1.872e-22 4.274e-11 0.000e+00   1.000
train_data$CategoryRUNAWAY                         -1.796e-22 7.726e-11 0.000e+00   1.000
train_data$CategorySECONDARY CODES                 -1.835e-22 4.450e-11 0.000e+00   1.000
train_data$CategorySEX OFFENSES FORCIBLE           -1.845e-22 4.683e-11 0.000e+00   1.000
train_data$CategorySTOLEN PROPERTY                 -1.870e-22 4.915e-11 0.000e+00   1.000
train_data$CategorySUICIDE                         -1.896e-22 1.370e-10 0.000e+00   1.000
train_data$CategorySUSPICIOUS OCC                  -1.870e-22 4.254e-11 0.000e+00   1.000
train_data$CategoryTRESPASS                        -1.857e-22 4.629e-11 0.000e+00   1.000
train_data$CategoryVANDALISM                       -1.867e-22 4.220e-11 0.000e+00   1.000
train_data$CategoryVEHICLE THEFT                   -1.875e-22 4.191e-11 0.000e+00   1.000
train_data$CategoryWARRANTS                         4.757e-11 4.235e-11 1.123e+00   0.261
train_data$CategoryWEAPON LAWS                     -1.882e-22 4.483e-11 0.000e+00   1.000
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.306e-10 on 4968 degrees of freedom
Multiple R-squared:    0.5, Adjusted R-squared:  0.4969
```

5. Association rule discovery output

Console ~/ ⇦

```
      X=-122.4034048,
      Y=37.77542071}                    => {PdDistrict=SOUTHERN}            0.0016  1.0000000     5.574136
7610 {Category=LARCENY/THEFT,
      DayOfWeek=Saturday,
      PdDistrict=SOUTHERN,
      X=-122.4034048,
      Y=37.77542071}                    => {Address=800 Block of BRYANT ST}  0.0016  1.0000000    52.083333
7611 {Category=LARCENY/THEFT,
      DayOfWeek=Saturday,
      PdDistrict=SOUTHERN,
      Address=800 Block of BRYANT ST,
      X=-122.4034048}                   => {Y=37.77542071}                   0.0016  1.0000000    54.347826
7612 {Category=LARCENY/THEFT,
      DayOfWeek=Saturday,
      PdDistrict=SOUTHERN,
      Address=800 Block of BRYANT ST,
      Y=37.77542071}                    => {X=-122.4034048}                  0.0016  1.0000000    54.347826
7613 {Category=LARCENY/THEFT,
      DayOfWeek=Sunday,
      Address=800 Block of BRYANT ST,
      X=-122.4034048,
      Y=37.77542071}                    => {PdDistrict=SOUTHERN}            0.0010  1.0000000     5.574136
7614 {Category=LARCENY/THEFT,
      DayOfWeek=Sunday,
      PdDistrict=SOUTHERN,
      X=-122.4034048,
      Y=37.77542071}                    => {Address=800 Block of BRYANT ST}  0.0010  1.0000000    52.083333
7615 {Category=LARCENY/THEFT,
      DayOfWeek=Sunday,
      PdDistrict=SOUTHERN,
      Address=800 Block of BRYANT ST,
      X=-122.4034048}                   => {Y=37.77542071}                   0.0010  1.0000000    54.347826
7616 {Category=LARCENY/THEFT,
      DayOfWeek=Sunday,
      PdDistrict=SOUTHERN,
      Address=800 Block of BRYANT ST,
      Y=37.77542071}                    => {X=-122.4034048}                  0.0010  1.0000000    54.347826
>
```

6. Graph plots
   Crimes_by_year.png
   Crimes_by_district.png
   Crimes_by_day.png