

Crime Rate Knowledge Mining in U.S. Communities

Submitted in partial fulfillment of the
requirements of the course

Business Intelligence Lab (ITL601)

In

T. E. Information Technology

By

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University of
Mumbai 2024-2025

CERTIFICATE

This is to certify that the project entitled “**Crime Rate Knowledge Mining in U.S. Communities** ” is a Bonafide work of **Tanmay Bhatkar (09), Mazin Bangi (08), Sahil Bangera (07) and Shannen Anthony (04)** submitted in partial fulfillment of the requirements of the course **Business Intelligence Lab (ITL601)**

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Class: TE-ITA/B, Semester: VI

Subject: **Business Intelligence Lab**

Business Intelligence Mini Project

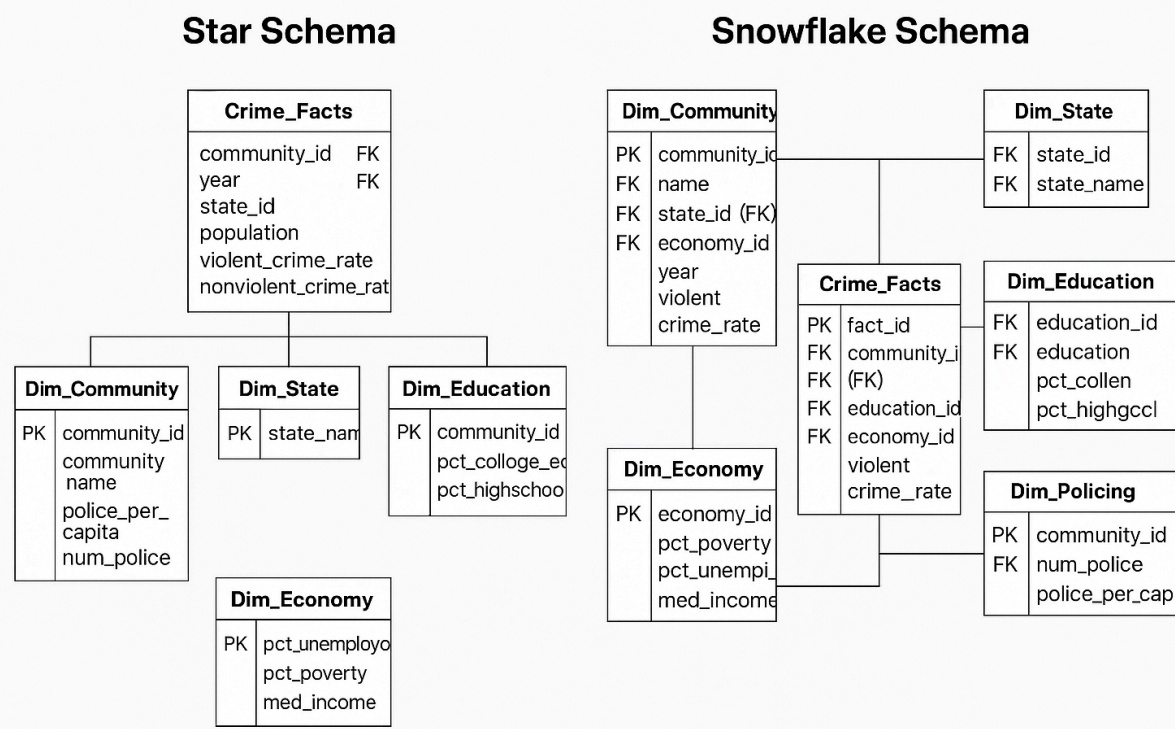
1. **Aim:** Develop a Business Intelligence Mini Project for a particular case study
0. **Objectives:** After study of this experiment, the students will be able to develop mini project
0. **Outcomes:**
CO6: Apply BI to solve practical problems: Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support
0. **Prerequisite:** Study of DM&BI Tools.
0. **Requirements:** Personal Computer, Windows XP operating system/Windows 7, Internet Connection, Microsoft Word, WEKA tool, Orange tool, BI Tool.
0. **Theory:** Nil
0. **Laboratory Exercise:** Each group select one case study for this. A BI report (Initial pages shared separately) must be prepared outlining the following steps:
 - a. Write the problem statement for your case study
 - a. Draw star schema and snowflake schema
 - b. Give dataset details, identifying which data mining task is needed
 - a. Download and use a standard data mining dataset available for the problem. Some links for data mining datasets are WEKA site, UCI Machine Learning Repository, KDD site, KDD Cup etc.
 - a. Implement the data mining algorithm using Weka and Orange
 - a. Interpret and visualize the results using BI tool like Qlikview & Tableau
 - a. After interpretation clearly provide the BI decision that is to be taken
0. **Post-Experiment Exercise:**
 - a. **Conclusion:**
 - o Summary of mini project
0. **Reference:** Business Intelligence: Data Mining and Optimization for Decision Making by Carlo Vercellis, Wiley India Publication

Laboratory Exercise:

a. Problem Statement

"To analyze socio-economic, demographic, and law enforcement factors influencing crime rates in U.S. communities and build a predictive model to identify high-risk areas for proactive resource allocation."

b. Draw star schema and snowflake schema



c. Dataset Details

Source: UCI Machine Learning Repository: Communities and Crime

Link: <https://archive.ics.uci.edu/dataset/183/communities+and+crime>

Size: 1,994 instances, 128 attributes (socio-economic factors + crime statistics).

Target Variable: ViolentCrimesPerPop (numerical).

Data Mining Task: Regression (predict crime rate) and Classification (identify high-risk communities).

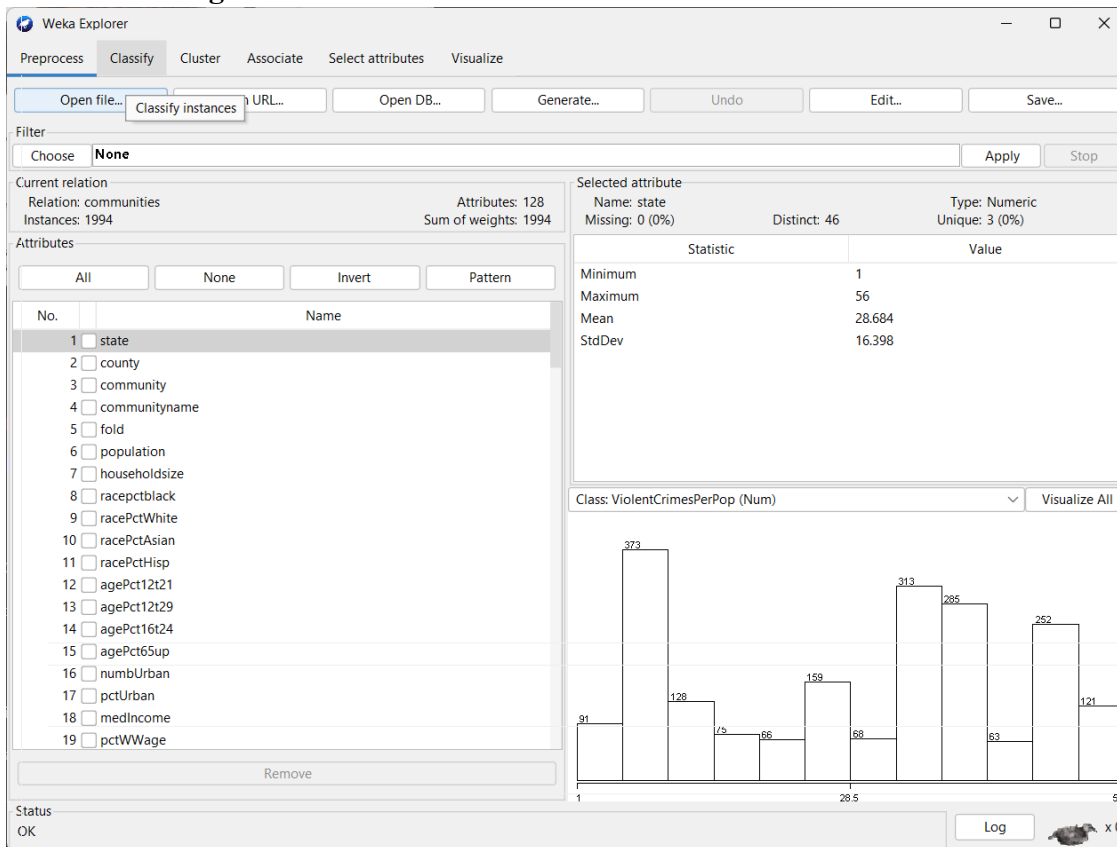
Key Attributes: population, medIncome, pctUnemployed, pctHousNoPhone, policePerPop.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	state	county	community	community: fold	population	household	racePctBl	racePctWh	racePctAsi	racePctHis	agePct12t	agePct12t: agePct16t	agePct16t: agePct65u	numbUrba	pctUrban	medIncom	pctWage	pctWfarm	pctWinvin	pctWSoc	pctWPubA		
2	8	?	?	Lakewood	1	0.19	0.33	0.02	0.9	0.12	0.17	0.34	0.47	0.29	0.32	0.2	1	0.37	0.72	0.34	0.6	0.29	0.15
3	53	?	?	TukwilaCity	1	0	0.16	0.12	0.74	0.45	0.07	0.26	0.59	0.35	0.27	0.02	1	0.31	0.72	0.11	0.45	0.25	0.29
4	24	?	?	Aberdeen	1	0	0.42	0.49	0.56	0.17	0.04	0.39	0.47	0.28	0.32	0	0	0.3	0.58	0.19	0.39	0.38	0.4
5	34	5	81440	Willingboro	1	0.04	0.77	1	0.08	0.12	0.1	0.51	0.5	0.34	0.21	0.06	1	0.58	0.89	0.21	0.43	0.36	0.2
6	42	95	6096	Bethlehem	1	0.01	0.55	0.02	0.95	0.09	0.05	0.38	0.38	0.23	0.36	0.02	0.9	0.5	0.72	0.16	0.68	0.44	0.11
7	6	?	?	SouthPasadena	1	0.02	0.28	0.06	0.54	1	0.25	0.31	0.48	0.27	0.37	0.04	1	0.52	0.68	0.2	0.61	0.28	0.15
8	44	7	41500	Lincolnton	1	0.01	0.39	0	0.98	0.06	0.02	0.3	0.37	0.23	0.6	0.02	0.81	0.42	0.5	0.23	0.68	0.61	0.21
9	6	?	?	SelmaCity	1	0.01	0.74	0.03	0.46	0.2	1	0.52	0.55	0.36	0.35	0	0	0.16	0.44	1	0.23	0.53	0.97
10	21	?	?	Henderson	1	0.03	0.34	0.2	0.84	0.02	0	0.38	0.45	0.28	0.48	0.04	1	0.17	0.47	0.36	0.34	0.55	0.48
11	29	?	?	ClaytonCity	1	0.01	0.4	0.06	0.87	0.3	0.03	0.9	0.82	0.8	0.39	0.02	1	0.54	0.59	0.22	0.86	0.42	0.02
12	6	?	?	DalyCity	1	0.13	0.71	0.15	0.07	1	0.41	0.4	0.52	0.35	0.33	0.15	1	0.49	0.71	0.16	0.47	0.36	0.4
13	36	?	?	RockvilleCity	1	0.02	0.46	0.08	0.91	0.07	0.1	0.34	0.36	0.22	0.57	0.04	1	0.72	0.53	0.23	0.74	0.63	0.17
14	25	21	44105	NeedhamHamp	1	0.03	0.47	0.01	0.96	0.13	0.02	0.29	0.32	0.2	0.52	0.04	1	0.8	0.55	0.18	0.87	0.51	0.07
15	55	87	30075	GrandChute	1	0.01	0.44	0	0.98	0.04	0.01	0.35	0.53	0.32	0.23	0.02	0.77	0.46	0.77	0.41	0.73	0.28	0.1
16	6	?	?	DanaPoint	1	0.04	0.36	0.01	0.85	0.14	0.26	0.32	0.46	0.3	0.31	0.05	1	0.71	0.67	0.42	0.55	0.25	0.14
17	19	187	91370	FortDodge	1	0.03	0.34	0.06	0.93	0.03	0.03	0.39	0.41	0.28	0.58	0	0	0.18	0.42	0.81	0.49	0.62	0.37
18	36	1	1000	AlbanyCity	1	0.15	0.31	0.4	0.63	0.14	0.06	0.58	0.72	0.65	0.47	0.16	1	0.22	0.52	0.1	0.51	0.48	0.39
19	34	27	17650	DenvilleTwp	1	0.01	0.53	0.01	0.94	0.2	0.03	0.34	0.39	0.27	0.36	0.02	0.76	0.79	0.77	0.13	0.77	0.44	0.15
20	18	?	?	Valparaiso	1	0.02	0.47	0.01	0.97	0.07	0.02	0.7	0.67	0.63	0.37	0	0	0.33	0.56	0.28	0.62	0.43	0.21
21	42	129	66376	RostraverTwp	1	0	0.41	0.05	0.96	0.01	0.01	0.37	0.37	0.24	0.55	0.01	0.58	0.23	0.34	0.33	0.51	0.7	0.36
22	6	?	?	ModestoCity	1	0.25	0.54	0.05	0.71	0.48	0.3	0.42	0.48	0.28	0.32	0.26	1	0.33	0.55	0.37	0.37	0.39	0.64
23	12	31	?	Jacksonville	1	1	0.42	0.47	0.59	0.12	0.05	0.41	0.53	0.34	0.33	1	0.99	0.28	0.62	0.16	0.36	0.4	0.3
24	41	?	?	KlamathFalls	1	0.01	0.34	0.02	0.87	0.07	0.11	0.49	0.56	0.43	0.47	0	0	0.13	0.4	0.26	0.42	0.52	0.41
25	19	193	93926	SiouxCity	1	0.11	0.43	0.04	0.89	0.09	0.06	0.45	0.48	0.31	0.46	0.13	1	0.22	0.52	0.44	0.49	0.56	0.41
26	6	?	?	DelanoCity	1	0.02	0.96	0.05	0	1	1	0.54	0.58	0.39	0.33	0	0	0.16	0.61	0.41	0.14	0.49	0.92
27	8	?	?	GoldenCity	1	0	0.33	0.02	0.91	0.16	0.09	0.55	0.63	0.53	0.31	0.02	1	0.29	0.64	0.6	0.57	0.3	0.15
28	6	?	?	GardenCity	1	0.06	0.49	0.46	0	1	0.43	0.35	0.5	0.32	0.34	0.08	1	0.35	0.68	0.16	0.36	0.36	0.38
29	39	29	61798	Perrytown	1	0.01	0.37	0.01	0.99	0.02	0.01	0.35	0.38	0.23	0.59	0	0	0.23	0.38	0.39	0.51	0.64	0.35
30	54	?	?	BeckleyCity	1	0.01	0.27	0.43	0.64	0.08	0.01	0.36	0.33	0.22	0.74	0	0	0.12	0.1	0.11	0.39	0.84	0.48

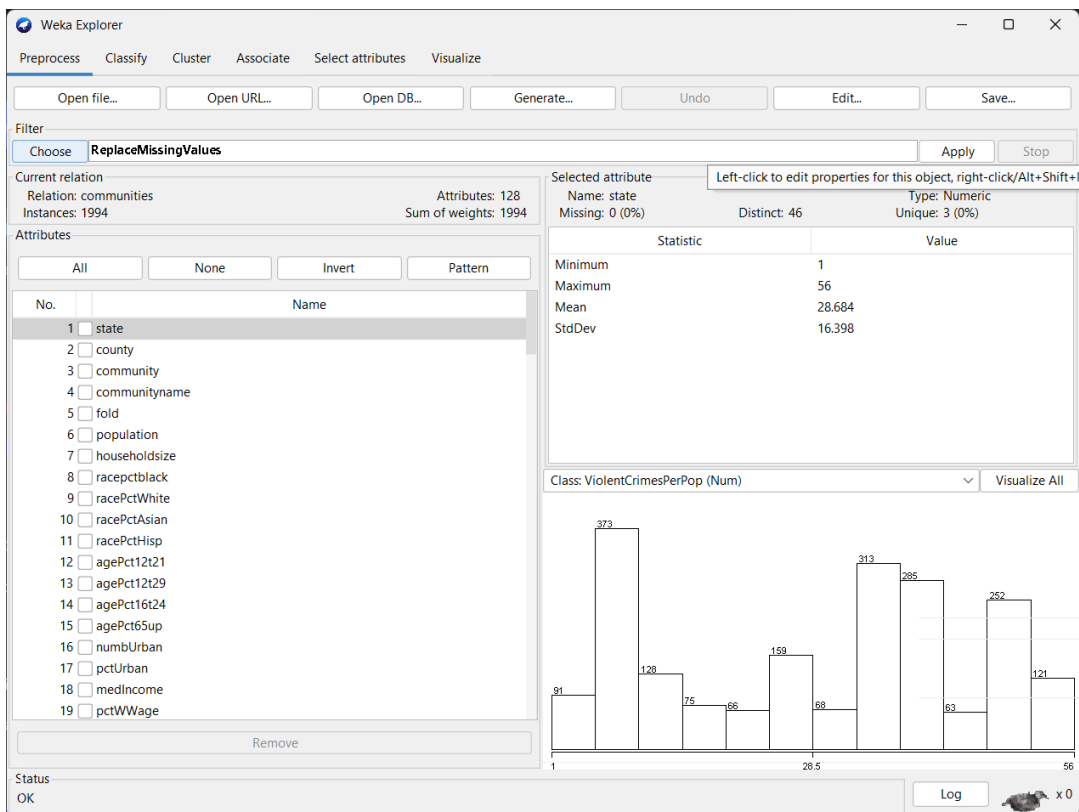
Snapshot of dataset

d. Implementation

Prediction using WEKA



Loading the dataset in weka



Replacing missing values with mean

Weka Explorer

Preprocess Classify Cluster Associate Select attributes Visualize

Open file... Open URL... Open DB... Generate... Undo Edit... Save...

Filter: Choose Remove -R 1,2,3,5 Apply Stop

Current relation: Relation: communities-weka.filters.unsupervised.attribute.Repla... Instances: 1994 Attributes: 124 Sum of weights: 1994

Attributes: All None Invert Pattern

No.	Name
1	<input checked="" type="checkbox"/> communityname
2	<input type="checkbox"/> population
3	<input type="checkbox"/> householdsSize
4	<input type="checkbox"/> racePctBlack
5	<input type="checkbox"/> racePctWhite
6	<input type="checkbox"/> racePctAsian
7	<input type="checkbox"/> racePctHispanic
8	<input type="checkbox"/> agePct12t21
9	<input type="checkbox"/> agePct12t29
10	<input type="checkbox"/> agePct16t24
11	<input type="checkbox"/> agePct65Sup
12	<input type="checkbox"/> numUrban
13	<input type="checkbox"/> pctUrban
14	<input type="checkbox"/> medIncome
15	<input type="checkbox"/> pctWWage
16	<input type="checkbox"/> pctWFarmSelf
17	<input type="checkbox"/> pctWinvInc
18	<input type="checkbox"/> pctWSocSec
19	<input type="checkbox"/> pctWPubAsst

Remove

Status: OK Log x 0

Selected attribute: Name: communityname Type: Nominal Missing: 0 (0%) Distinct: 1828 Unique: 1707 (86%)

No.	Label	Count	Weight
1	Lakewoodcity	3	3
2	Tukowilacity	1	1
3	Aberdeentown	1	1
4	Willingborotownship	1	1
5	Bethlehemtownship	1	1
6	SouthPasadenacity	1	1
7	Lincolntown	1	1
8	Selmacity	2	2
9	Hendersoncity	3	3
10	Claytoncity	1	1

Class: ViolentCrimesPerPop (Num) Visualize All

Too many values to display.

non-predictive columns like state, county, community, and fold removed.

Linear Regression based prediction:

Choose LinearRegression -S 0 -R 1.0E-8 -num-decimal-places 4

Test options: Use training set Supplied test set Set... Cross-validation Folds 10 Percentage split % 66 More options...

(Num) ViolentCrimesPerPop Start Stop

Result list (right-click for options): 02:44:42 - functions.LinearRegression

Classifier output:

```

=== Run information ===

Scheme:      weka.classifiers.functions.LinearRegression -S 0 -R 1.0E-8 -num-decimal-places 4
Relation:    communities-weka.filters.unsupervised.attribute.ReplaceMissingValues-weka.filters.u
Instances:   1994
Attributes:  123
              [list of attributes omitted]
Test mode:   10-fold cross-validation

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

Linear Regression Model

ViolentCrimesPerPop =

    0.2451 * population +
    0.1856 * racePctBlack +
   -0.0505 * racePctWhite +
   -0.0282 * racePctAsian +
    0.0668 * racePctHispanic +
    0.0807 * agePct12t21 +
   -0.2753 * agePct12t29 +
   -0.0882 * agePct16t24 +
    0.0349 * agePct65Sup +
   -0.3337 * numUrban +
    0.048  * pctUrban +
   -0.2137 * medIncome +
   -0.1885 * pctWWage +
    0.0469 * pctWFarmSelf +
   -0.1837 * pctWinvInc +
    0.0896 * pctWSocSec +
   -0.0979 * pctWRetire +
    0.3262 * medFamInc +
    0.1564 * perCapInc +
   -0.392  * whitePerCap +
   -0.0355 * blackPerCap +
   -0.0359 * indianPerCap +
    0.0435 * OtherPerCap +
    0.0335 * HispPerCap +
   -0.157  * PctPopUnderPov +
   -0.1222 * PctLess9thGrade +
  
```

Classifier

Choose **LinearRegression** -S 0 -R 1.0E-8 -num-decimal-places 4

Test options

☐ Use training set
☐ Supplied test set Set...
☒ Cross-validation Folds
☐ Percentage split %

More options...

(Num) ViolentCrimesPerPop

Start

Stop

Result list (right-click for options)

02:44:42 - functions.LinearRegression

Classifier output

0.1222 * PctLessJCHGrade +
0.0884 * PctNotHSGrad +
0.0401 * PctBSorMore +
0.2434 * PctEmploy +
-0.0594 * PctEmplManu +
0.075 * PctOccupManu +
0.1113 * PctOccupMgmtProf +
0.4408 * MalePctDivorce +
0.2139 * MalePctNevMarr +
0.1628 * FemalePctDiv +
-0.5599 * TotalPctDiv +
-0.0743 * PersPerFam +
-0.3195 * PctKids2Par +
-0.03 * PctYoungKids2Par +
0.0601 * PctWorkMomYoungKids +
-0.1863 * PctWorkMom +
0.1133 * PctIlleg +
-0.1647 * NumImmig +
0.0338 * PctImmigRecent +
-0.0665 * PctImmigRec8 +
0.0514 * PctImmigRec10 +
-0.081 * PctRecentImmig +
-0.1025 * PctRecImmig5 +
0.4004 * PctRecImmig8 +
-0.2119 * PctRecImmig10 +
-0.0395 * PctSpeakEnglOnly +
-0.1852 * PctNotSpeakEnglWell +
-0.1508 * PctLargHouseOccup +
0.6029 * PersPerOccupHous +
-0.1341 * PersPerOwnOccHous +
-0.2433 * PersPerRentOccHous +
-0.5905 * PctPersOwnOccup +
0.1964 * PctPersDenseHous +
0.088 * PctHousLess3BR +
0.0275 * MedNumBR +
0.1648 * HousVacant +
-0.0436 * PctHousOccup +
0.4488 * PctHousOwnOcc +
0.0549 * PctVacantBoarded +
-0.0756 * PctVacMore6Mos +
-0.2875 * OwnOccLowQuart +
0.2225 * OwnOccMedVal +
-0.2258 * RentLowQ +

-0.034 * RentMedian +
-0.0641 * RentHighQ +
0.3741 * MedRent +
0.0405 * MedRentPctHousInc +
-0.0493 * MedOwnCostPctInc +
-0.0805 * MedOwnCostPctIncNoMtg +
0.1104 * NumInShelters +
0.1713 * NumStreet +
0.139 * PctForeignBorn +
0.0313 * PctSameCity85 +
-1.084 * LemasSwornFT +
-0.7676 * LemasSwFTFieldOps +
0.3413 * LemasSwFTFieldPerPop +
-0.2191 * LemasTotalReq +
0.1434 * PolicReqPerOffic +
-0.1379 * PctPolicWhite +
0.0721 * PctPolicAsian +
-0.0858 * PctPolicMinor +
-0.2664 * OfficAssgnDrugUnits +
-0.0472 * PctUsePubTrans +
0.0944 * PolicCars +
0.6459 * PolicOperBudg +
-0.0769 * LemasPctPolicOnPatr +
0.0352 * LemasGangUnitDeploy +
0.0379 * LemasPctOfficDrugUn +
-0.3146 * PolicBudgPerPop +
1.4413

Time taken to build model: 0.31 seconds

=== Cross-validation ===

=== Summary ===

Correlation coefficient	0.8009
Mean absolute error	0.0983
Root mean squared error	0.1397
Relative absolute error	55.1269 %
Root relative squared error	59.9784 %
Total Number of Instances	1994

OUTPUT

Output Meaning:

The linear regression model assigns weights to each feature to predict crime rates. A negative weight means the feature helps reduce crime, while a positive one indicates an increase. For example, a higher percentage of officers on patrol or a larger police budget per capita is linked with lower crime. On the other hand, more drug unit officers or gang unit deployment slightly increased predicted crime. The model starts with a base value (intercept) and adjusts based on these inputs.

SOME KEY INSIGHTS FOUND USING LINEAR REGRESSION

1) *High Divorce Rates → Higher Crime*

+0.4408 = MalePctDivorce, +0.2139 = MalePctNevMarr, +0.1628 = FemalePctDiv

Divorce and lack of marriage in males are strongly associated with higher predicted crime. This suggests a potential link between family instability and social outcomes.

2) *Two-Parent Households → Lower Crime*

-0.3195 = PctKids2Par, -0.03 = PctYoungKids2Par

A higher percentage of children living with two parents correlates with lower crime, reinforcing the role of stable family environments.

3) *More People per Household → Higher Crime*

+0.6029 = PersPerOccupHous

A high number of persons per occupied house is strongly linked to increased crime, which may reflect overcrowding and economic stress.

4) *Educational Attainment Shows Mixed Effects*

-0.1222 = PctLess9thGrade vs. +0.0884 = PctNotHSGrad and +0.0401 = PctBSorMore

The influence of education on crime is not linear—very low education correlates with less crime, which might reflect other underlying demographic traits, while some higher education levels slightly increase predicted crime, possibly due to collinearity or socioeconomic mixing.

5) *Higher White Per Capita Income → Lower Crime*

-0.392 = whitePerCap, -0.2137 = medIncome

Higher median income and white per capita income show a strong negative association with crime, indicating that wealthier communities tend to be safer.

Metric	Meaning
Correlation coefficient (0.8009)	Strong correlation between predicted and actual values. Values close to 1 mean better fit.
Mean Absolute Error (0.0983)	On average, predictions are off by about 0.098 (in the scale of your target variable).
Root Mean Squared Error (0.1397)	Penalizes larger errors more. Lower is better.
Relative Absolute Error (55.13%)	MAE relative to just predicting the average. Lower % = better.
Root Relative Squared Error (59.98%)	RMSE relative to baseline. Below 60% = decent model.
Instances: 1994	Total records evaluated.

WEKA

(RANDOM FOREST)

Classifier

Choose RandomForest -P 100 -I 100 -num-slots 1 -K 0 -M 1.0 -V 0.001 -S 1

Test options

☐ Use training set

☐ Supplied test set

Set...

☒ Cross-validation

Folds 10

☐ Percentage split

% 66

More options...

(Num) ViolentCrimesPerPop

Start

Stop

Result list (right-click for options)

02:44:42 - functions.LinearRegression

02:59:31 - trees.RandomForest

Classifier output

=== Run information ===

Scheme: weka.classifiers.trees.RandomForest -P 100 -I 100 -num-slots 1 -K 0 -M 1.0 -V 0.001 -S 1

Relation: communities-weka.filters.unsupervised.attribute.ReplaceMissingValues-weka.filters.unsuperv

Instances: 1994

Attributes: 123

[list of attributes omitted]

Test mode: 10-fold cross-validation

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

RandomForest

Bagging with 100 iterations and base learner

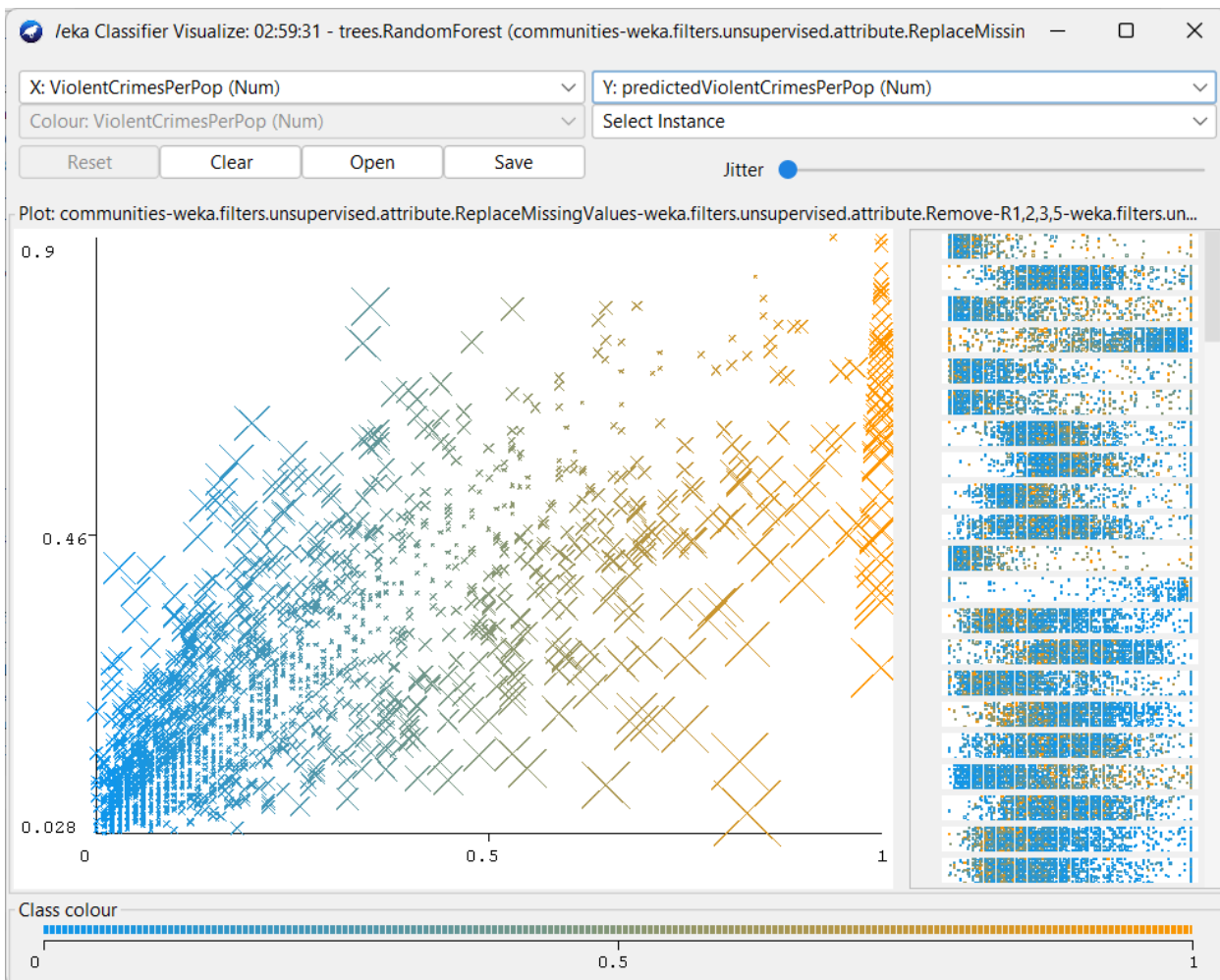
weka.classifiers.trees.RandomTree -K 0 -M 1.0 -V 0.001 -S 1 -do-not-check-capabilities

Time taken to build model: 1.21 seconds

=== Cross-validation ===

=== Summary ===

Correlation coefficient	0.814
Mean absolute error	0.0941
Root mean squared error	0.1361
Relative absolute error	52.7416 %
Root relative squared error	58.3965 %
Total Number of Instances	1994



```
Plot : weka.classifiers.trees.RandomForest (communities-weka.filters.unsupervi
Instance: 1267
```

```
population : 0.34
householdsize : 0.43
racepctblack : 0.86
racePctWhite : 0.3
racePctAsian : 0.1
racePctHisp : 0.03
agePct12t21 : 0.6
agePct12t29 : 0.64
agePct16t24 : 0.54
agePct65up : 0.36
numbUrban : 0.35
pctUrban : 1.0
medIncome : 0.17
pctWWage : 0.5
pctWFarmSelf : 0.22
pctWInvInc : 0.36
pctWSocSec : 0.39
pctWPubAsst : 0.47
pctWRetire : 0.45
medFamInc : 0.22
perCapInc : 0.25
whitePerCap : 0.41
blackPerCap : 0.16
indianPerCap : 0.31
AsianPerCap : 0.21
OtherPerCap : 0.27
HispPerCap : 0.45
NumUnderPov : 0.5
PctPopUnderPov : 0.7
PctLess9thGrade : 0.3
PctNotHSGrad : 0.39
PctBSorMore : 0.45
PctUnemployed : 0.62
PctEmploy : 0.38
```

High Crime Correlations:

PctUnemployed (0.62): Unemployment is a strong predictor of crime. High unemployment (62%) is typically linked to higher crime rates due to social instability, lack of economic opportunities, and frustration among individuals who may resort to criminal activity as a means of survival.

PctPopUnderPov (0.7): 70% of the population living below the poverty line is another significant predictor. Poverty often correlates with crime, especially violent crime, as communities in poverty tend to face higher levels of desperation, social unrest, and lack of access to legal resources.

MedIncome (0.17) and MedFamInc (0.22): The low median income (both individual and family) indicates an economically disadvantaged community, which can lead to increased crime rates. Economic strain often fuels crime, particularly violent crimes.

PctBSorMore (0.45): While there is a significant portion of the population with a bachelor's degree or more (45%), the education disparity might contribute to unequal opportunities. Lack of access to quality education and well-paying jobs could drive some individuals to commit crimes.

PctUrban (1.0): Fully urbanized communities often have higher crime rates due to population density, anonymity, and greater opportunities for criminal activity. The urban environment might increase exposure to criminal elements or violence.

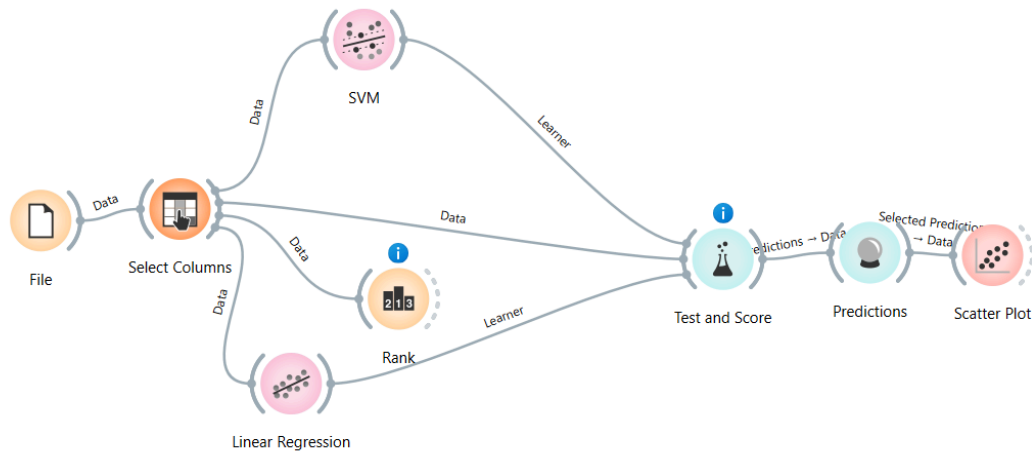
Specific Crime Predictions Based on Attributes: ***Race Demographics:***

With **RacePctBlack (0.86)** being 86%, the racial composition of the community may also correlate with crime patterns. Certain neighborhoods with racial homogeneity, especially if they face systemic challenges, can see higher crime rates due to historical and social factors.

Age Distribution:

A young population (60% between 12-21) is a typical age range where crime rates, especially violent crime, tend to be higher. Young individuals are more likely to be involved in criminal activity, either as perpetrators or victims.

High Divorce Rate (MalePctDivorce: 54%): High divorce rates can contribute to family instability, which is often a contributing factor to violent crime in communities. Broken families can lead to a lack of supervision and support for young people, increasing the likelihood of delinquency.



Setting Up workflow and adding my dataset

Test and Score - Orange

File Edit View Window Help

Cross validation

Number of folds: 10

☒ Stratified

☐ Cross validation by feature

☐ Random sampling

Repeat train/test: 10

Training set size: 66 %

☒ Stratified

☐ Leave one out

☐ Test on train data

☐ Test on test data

Model	MSE	RMSE	MAE	MAPE	R2
Linear Regression	2354227678222024192.000	1534349268.655	34360672.480	2079764860506.429	-43392109165999783936.000
SVM	0.030	0.173	0.139	5366652181541.621	0.448

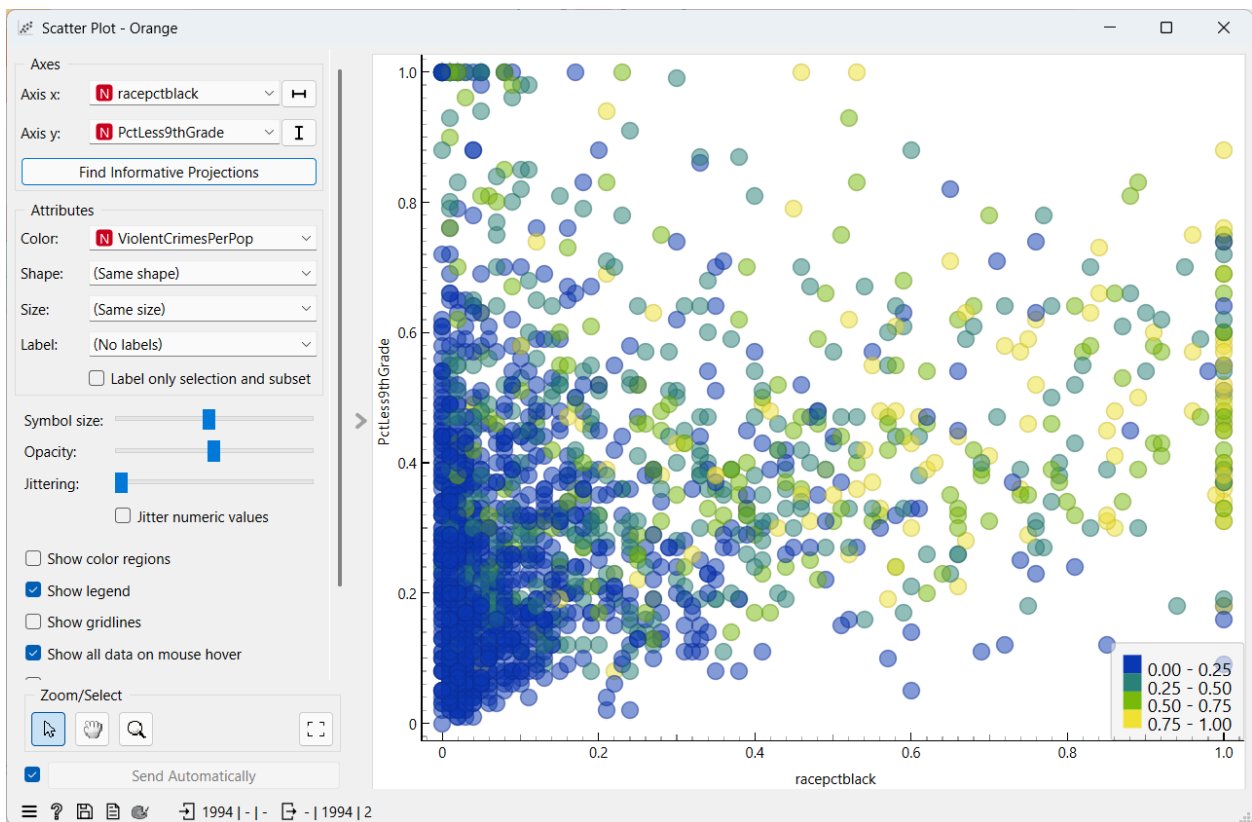
Comparing the metrics across both models

Predictions - Orange

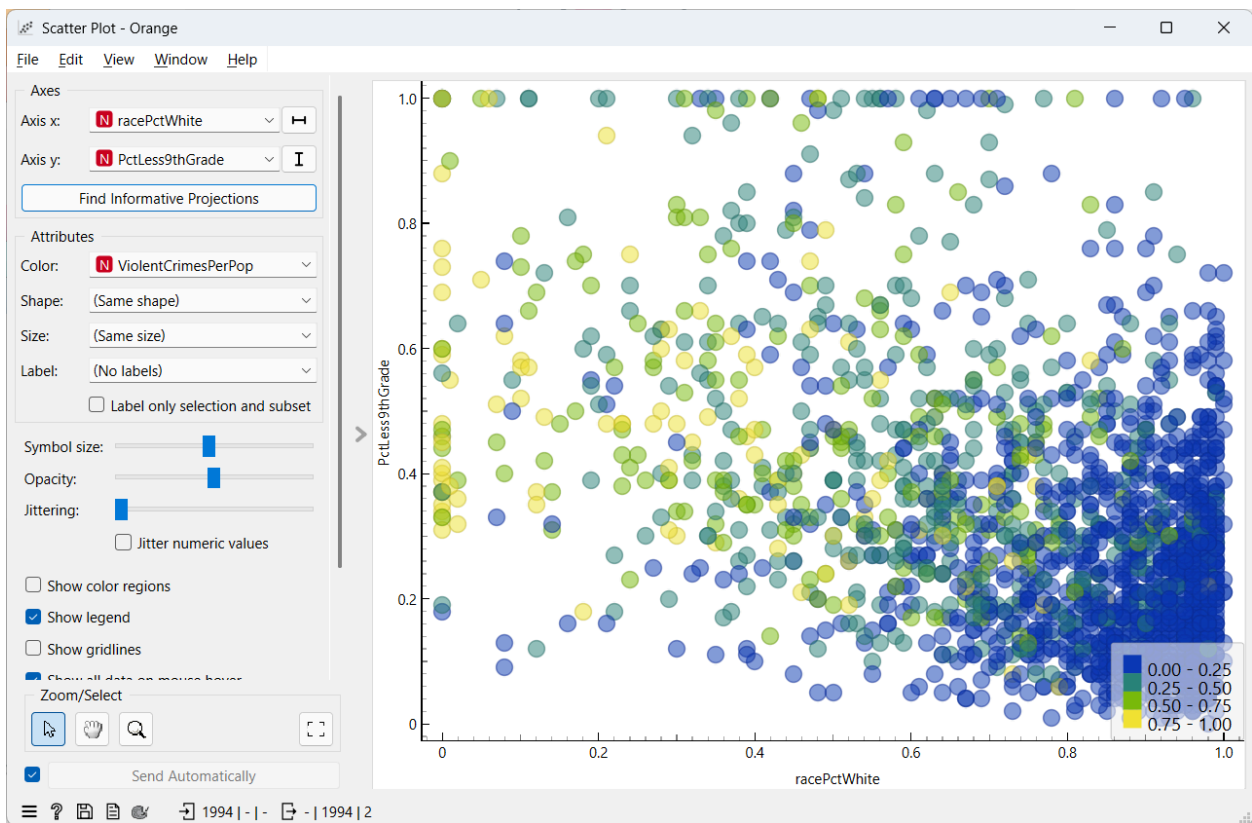
Shown regression error: Difference

	Linear Regression	SVM	Fold	population	householdsize	racePctBlack	racePctWhite	racePctAsian	racePctHispanic	agePct12to17	agePct18to24	agePct25to34	agePct35to44	agePct45to54	agePct55to64	agePct65to74	agePct75to84	agePct85to94	agePct95to104
0.02	0.0415898	0.18381	1	0.00	0.50	0.01	0.98	0.02	0.01	0.31	0.40	0.23	0.23	0.25	0.25	0.25	0.25	0.25	0.25
0.12	0.116382	0.270367	1	0.01	0.35	0.01	0.98	0.03	0.01	0.39	0.44	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
0.22	0.247127	0.285727	1	0.16	0.44	0.05	0.76	0.53	0.21	0.37	0.49	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29
0.14	0.170542	0.212615	1	0.04	0.25	0.01	0.91	0.27	0.09	0.15	0.42	0.19	0.19	0.26	0.26	0.26	0.26	0.26	0.26
0.05	0.154825	0.202876	1	0.00	0.39	0.01	0.97	0.03	0.01	0.39	0.47	0.29	0.29	0.52	0.52	0.52	0.52	0.52	0.52
0.04	0.0973523	0.174569	1	0.04	0.57	0.05	0.91	0.22	0.02	0.46	0.38	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
0.09	0.150464	0.303627	1	0.14	0.34	0.02	0.96	0.07	0.04	0.36	0.56	0.35	0.35	0.43	0.43	0.43	0.43	0.43	0.43
0.40	0.540267	0.606643	1	0.64	0.35	0.08	0.62	0.13	0.54	0.50	0.60	0.46	0.46	0.40	0.40	0.40	0.40	0.40	0.40
0.05	0.0154237	0.132242	1	0.01	0.34	0.02	0.97	0.05	0.01	0.30	0.35	0.23	0.23	0.59	0.59	0.59	0.59	0.59	0.59
0.22	0.284136	0.34083	1	0.06	0.43	0.08	0.90	0.11	0.18	0.25	0.48	0.27	0.27	0.28	0.28	0.28	0.28	0.28	0.28
0.17	0.258309	0.280538	1	0.02	0.45	0.01	0.99	0.03	0.01	0.68	0.64	0.61	0.61	0.45	0.45	0.45	0.45	0.45	0.45
0.62	0.480107	0.530214	1	0.03	0.78	0.01	0.31	0.24	1.00	0.46	0.57	0.36	0.36	0.39	0.39	0.39	0.39	0.39	0.39
0.06	0.00820103	0.070988	1	0.01	0.41	0.03	0.86	0.43	0.09	0.26	0.38	0.23	0.23	0.58	0.58	0.58	0.58	0.58	0.58
0.01	0.120767	0.310962	1	0.00	0.31	0.01	0.99	0.03	0.00	0.36	0.35	0.21	0.21	0.57	0.57	0.57	0.57	0.57	0.57
0.66	0.52965	0.601098	1	0.03	0.19	0.25	0.75	0.10	0.22	0.22	0.50	0.29	0.29	0.41	0.41	0.41	0.41	0.41	0.41
0.06	0.128404	0.32221	1	0.00	0.50	0.02	0.98	0.02	0.00	0.53	0.44	0.35	0.35	0.48	0.48	0.48	0.48	0.48	0.48
0.88	0.828334	0.755245	1	0.19	0.44	0.70	0.29	0.15	0.24	0.55	0.69	0.54	0.54	0.38	0.38	0.38	0.38	0.38	0.38
0.02	0.0443821	0.257323	1	0.02	0.61	0.03	0.96	0.05	0.04	0.44	0.43	0.28	0.28	0.26	0.26	0.26	0.26	0.26	0.26
0.18	0.297413	0.424584	1	0.04	0.35	0.03	0.89	0.18	0.05	0.34	0.50	0.30	0.30	0.36	0.36	0.36	0.36	0.36	0.36
0.63	0.519003	0.548529	1	0.10	0.30	0.39	0.67	0.05	0.06	0.38	0.42	0.31	0.31	0.77	0.77	0.77	0.77	0.77	0.77
0.04	0.0442528	0.221614	1	0.01	0.57	0.01	0.98	0.04	0.00	0.36	0.35	0.18	0.18	0.33	0.33	0.33	0.33	0.33	0.33
0.19	0.287268	0.307525	1	0.01	0.31	0.16	0.86	0.03	0.01	0.40	0.41	0.27	0.27	0.66	0.66	0.66	0.66	0.66	0.66
0.11	0.156294	0.222077	1	0.03	0.54	0.02	0.97	0.07	0.03	0.38	0.48	0.31	0.31	0.43	0.43	0.43	0.43	0.43	0.43
0.12	0.27716	0.278198	1	0.01	0.22	0.02	0.97	0.02	0.01	0.19	0.24	0.14	0.14	1.00	1.00	1.00	1.00	1.00	1.00
0.29	0.37709	0.581775	1	0.00	0.90	0.00	0.63	0.05	0.10	0.54	0.56	0.37	0.37	0.35	0.35	0.35	0.35	0.35	0.35
0.45	0.332754	0.599520	1	0.04	0.20	0.00	0.87	0.23	0.10	0.30	0.35	0.22	0.22	0.67	0.67	0.67	0.67	0.67	0.67
0.23	0.271223	0.47298	1	0.09	0.54	0.23	0.59	0.04	0.43	0.51	0.56	0.27	0.27	0.20	0.20	0.20	0.20	0.20	0.20
0.32	0.329603	0.332393	1	0.03	0.35	0.21	0.83	0.01	0.01	0.39	0.45	0.30	0.30	0.54	0.54	0.54	0.54	0.54	0.54
0.37	0.633852	0.593215	1	0.01	0.47	0.78	0.36	0.03	0.02	0.47	0.55	0.37	0.37	0.40	0.40	0.40	0.40	0.40	0.40
0.30	0.290585	0.419423	1	0.08	0.57	0.05	0.78	0.30	0.29	0.41	0.49	0.28	0.28	0.22	0.22	0.22	0.22	0.22	0.22
0.00	0.202241	0.315683	1	0.00	1.00	0.24	0.73	0.16	0.10	0.76	0.81	0.72	0.72	0.03	0.03	0.03	0.03	0.03	0.03
0.02	0.0486486	0.232954	1	0.01	0.34	0.00	0.98	0.05	0.02	0.34	0.51	0.28	0.28	0.42	0.42	0.42	0.42	0.42	0.42

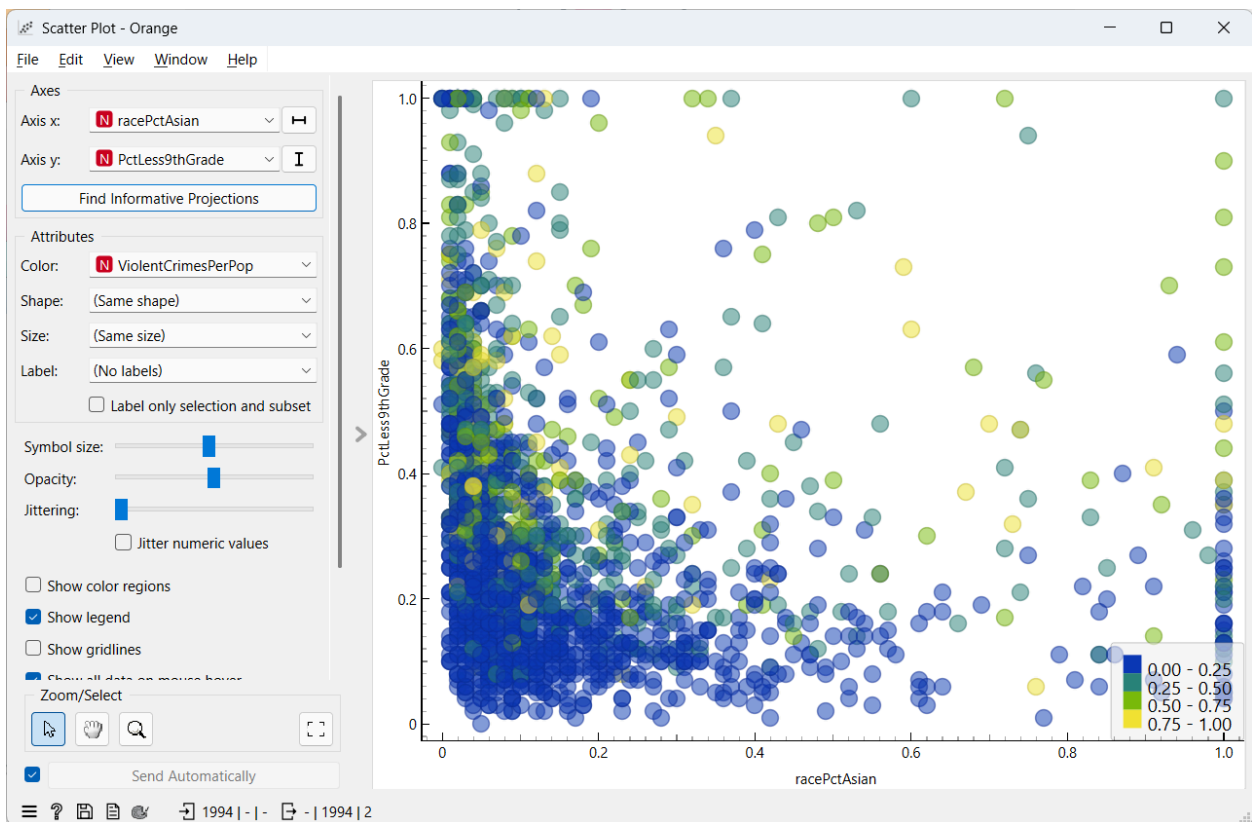
1st 4 columns showing actual crime vs crime predicted by both models in various communities



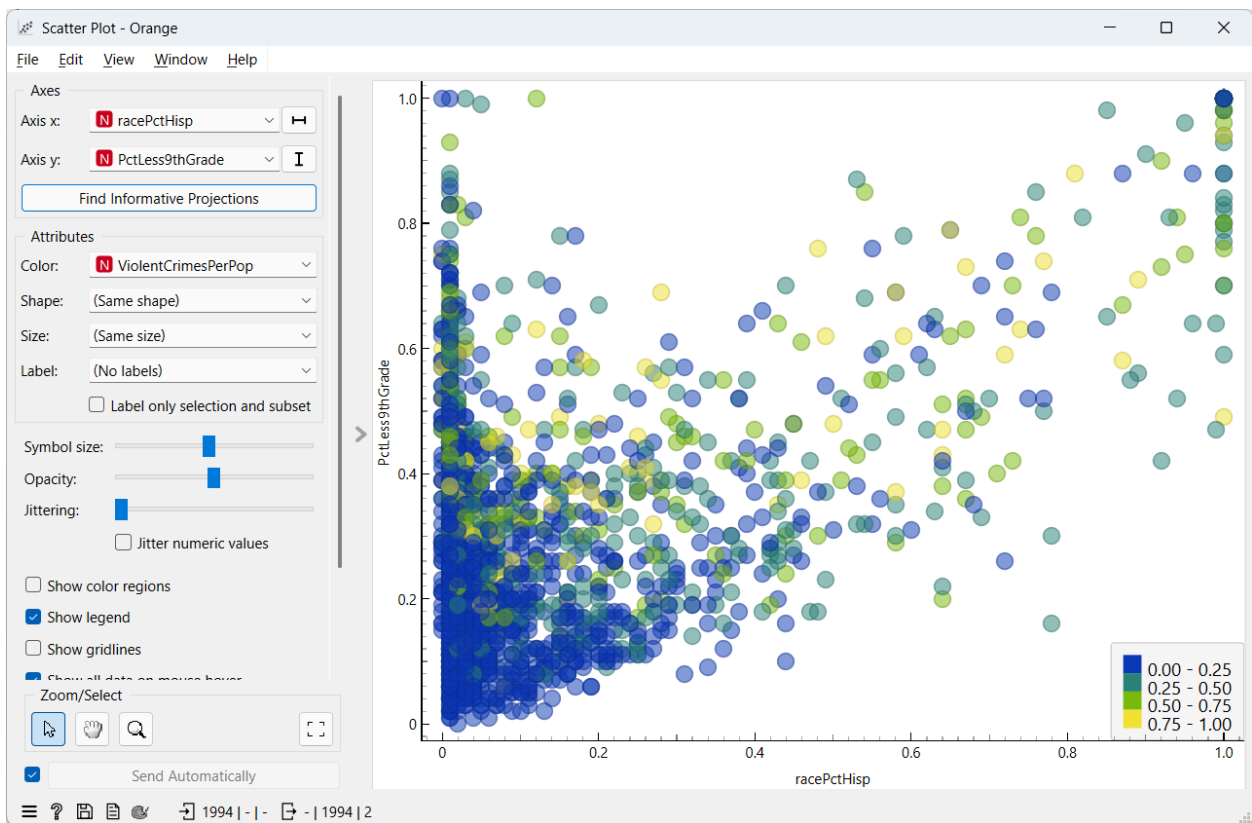
Race="Black" and Education less than 10th grade across Violent crime per population as color



Race="White" and Education less than 10th grade across Violent crime per population as color



Race="Asian" and Education less than 10th grade across Violent crime per population as color



Race="Hispanic" and Education less than 10th grade across Violent crime per population as color

Tableau

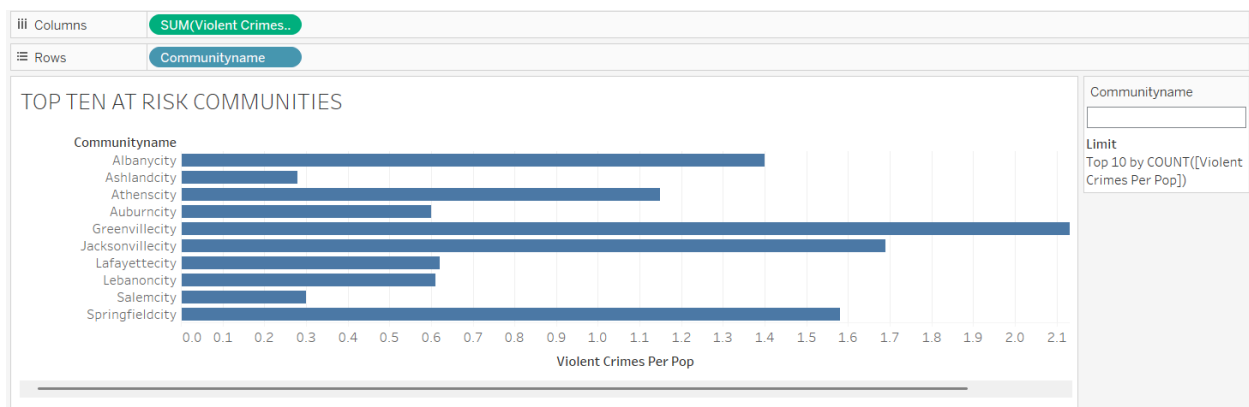
communities

communities.csv

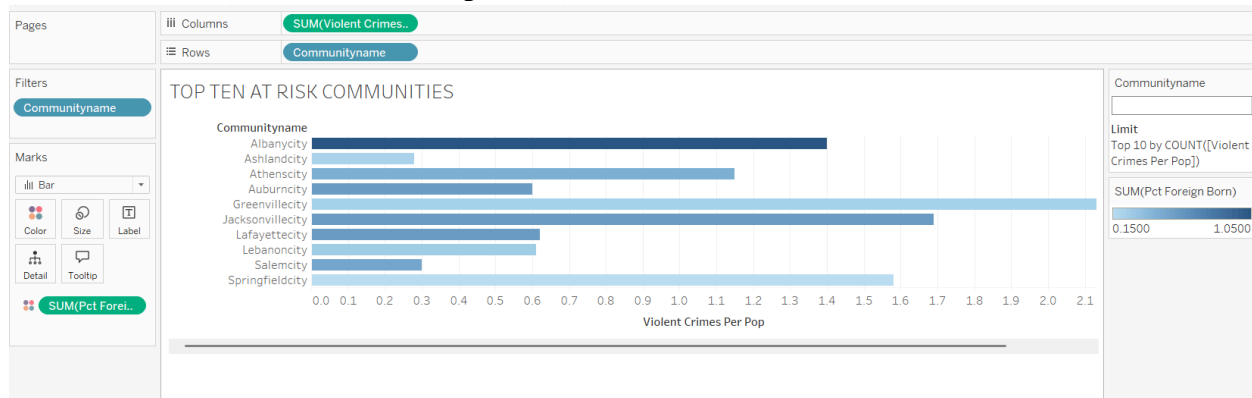
communities.csv 128 fields 1994 rows

State	County	Community	Communityname	Fold	Population	Householdsize
8	?	?	Lakewoodcity	1	0.19000	0.330000
53	?	?	Tukwilacity	1	0.00000	0.160000
24	?	?	Aberdeentown	1	0.00000	0.420000
34	5	81440	Willingborotownship	1	0.04000	0.770000
42	95	6096	Bethlehemtownship	1	0.01000	0.550000
6	?	?	SouthPasadenacity	1	0.02000	0.280000
44	7	41500	Lincolntown	1	0.01000	0.390000
6	?	?	Selmacity	1	0.01000	0.740000
21	?	?	Hendersontown	1	0.03000	0.340000
29	?	?	Claytoncity	1	0.01000	0.400000
6	?	?	DalyCitycity	1	0.13000	0.710000
36	?	?	RockvilleCentrevillage	1	0.02000	0.460000
25	21	44105	Needhamtown	1	0.03000	0.470000
55	87	30075	GrandChutetown	1	0.01000	0.440000
6	?	?	DanaPointcity	1	0.04000	0.360000

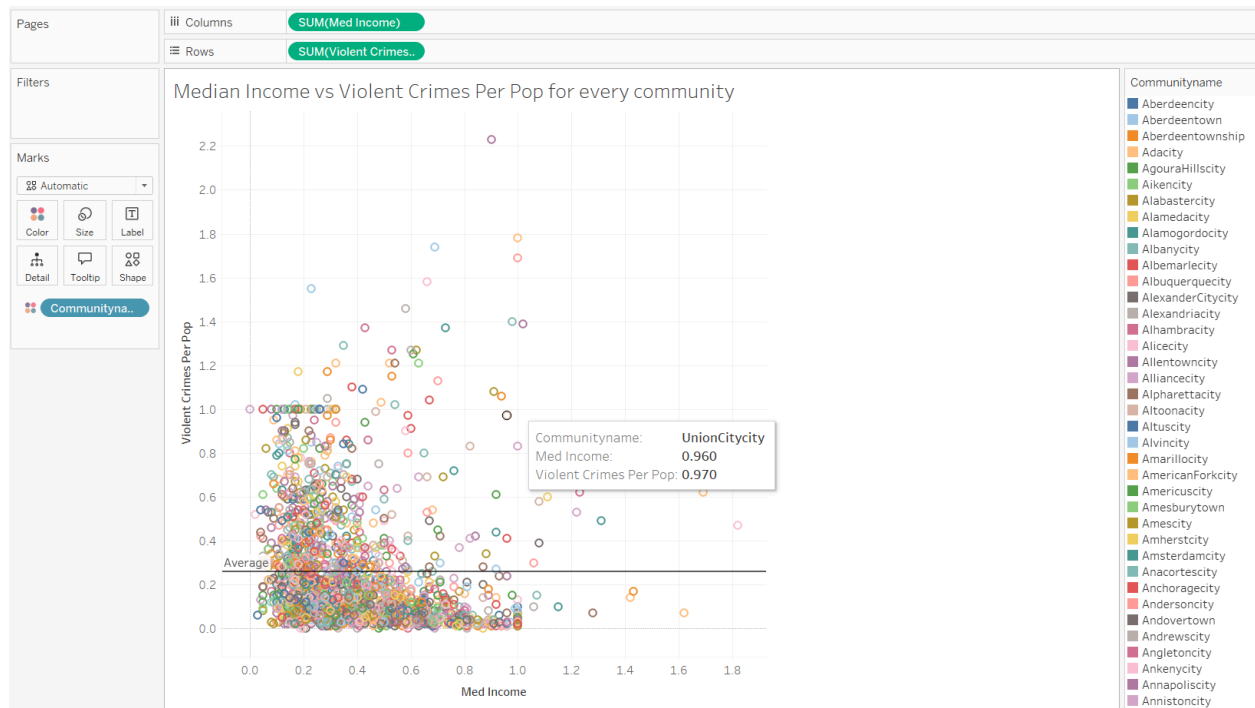
Loading my dataset in Tableau



Top Ten at Risk Communities



Top Ten at Risk Communities with crime committed by foreign born individuals



Median Income vs Violent Crimes Per Pop for every community

f. BI Decision

Resource Allocation:

Prioritize policing and social programs in communities with:

Poverty levels > 50%

Unemployment rates > 60%

Youth population (age 12–21) > 50%

Policy Recommendation:

Invest in youth-targeted job training and employment programs to address immediate unemployment and prevent youth involvement in violent crime.

Complement with family support initiatives and community-based engagement centers to strengthen social structure and reduce long-term crime risk.