GIT Repo: <https://github.com/linyuyuan630/594-final-project>

TODOs

1. *~~Input  arguments validate (~~****~~finished~~****~~)~~*
2. *~~Test question 0 to 5, and false input. e.g. AAA,DDD,100 etc. (finished)~~*
3. **Test question 6 (the additional feature) (Andy to do), there was Nullpoint error using real data**
4. *~~Add logging (finished)~~*
5. *~~Make sure console output is as required (e.g. to output integer instead of double) (finished)~~*
6. *~~Optimization (make sure each file is opened once - using singleton design pattern) (finished)~~*
7. **Report** (Andy WIP, Kevin to review)
8. *~~Testing using CSV file (finished)~~*
9. *~~Testing using JSON file (system can run, didn’t test logic) = (verified across csv and json)~~*
10. *~~Test with real data ISSUE: 1. Very slow loading properties.csv (253m).  2. Issue with question 2 (2918640:  Infinity)  == fixed~~*

Arguments with real data

csv parking.csv properties.csv population.txt log.real.csv

json parking.json properties.csv population.txt log.real.json

Arguments used in testing (json logic not tested )

csv parkingTest.csv propertiesTest.csv populationTest.txt log.test.cvs

json parkingTest.json propertiesTest.csv populationTest.txt log.test.json

**Testing result based on CSV testing data (logic verified)**

**==== test question 1 (verified) ====**

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

1

1526206

**==== test question 2 (verified) ====**

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

2

19103:  0.0032864706956362974

19104:  0.003262044471896232

19106:  0.0030664395229982964

19107:  0.0024201680672268906

19123:  0.0026833631484794273

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

**==== test question 3 (verified) ====**

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

3

Enter a zip code: 19103

2500

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

3

Enter a zip code: 19104

1333

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

3

Enter a zip code: 19123

2500

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

3

Enter a zip code: 19107

3000

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

**==== test question 4 (verified) ====**

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

4

Enter a zip code: d

0

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

4

Enter a zip code: 19103

350

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

4

Enter a zip code: 19104

133

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

4

Enter a zip code: 19107

350

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

**==== test question 5 (verified) ====**

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

5

Enter a zip code: 19103

0.22822713164140954

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

5

Enter a zip code: 19104

0.07720815318097592 ==> Note in the final code, converted into integer.

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

**===== Loggging added and Tested =====**

1597516671000 json parkingTest.csv propertyTest.csv populationTest.txt log.txt

1597516671003 Openning file:parkingTest.csv

1597516671005 Openning file:populationTest.txt

1597516671012 Openning file:propertyTest.csv

1597516673337 user's choice:1

1597516675147 user's choice:2

1597516676110 user's choice:3

1597516678547 user's input zipcode:19102

1597516679670 user's choice:3

1597516682523 user's input zipcode:19103

1597516684190 user's choice:4

1597516686833 user's input zipcode:19104

1597516688616 user's choice:5

1597516690813 user's input zipcode:19104

1597516692100 user's choice:6

1597516696546 user's choice:0

19130:  1.9284278246883795

19131:  0.061498193273417955

19132:  0.1869140840410279

19133:  0.15278363964240493

19134:  0.11568191182529872

19135:  0.09207941736423801

19136:  0.05587128201343273

19138:  0.022309670622501783

19139:  0.44030917593467567

19140:  0.34581493728409657

19141:  0.49432687404385517

19142:  0.1886805203581686

19143:  0.09623895511110425

19144:  0.3247940178633248

19145:  0.31095406360424027

19146:  1.1602825164469

19147:  2.482665341724633

19148:  0.41424032815893186

19149:  0.09060829727666073

19150:  0.03285139875096244

19151:  0.050563865743064616

19152:  0.03727510287447812

19153:  0.03254751611061261

19154:  0.0014914025032167506

**Testing result based on REAL testing data (logic verified across json and csv)**

csv parking.csv properties.csv population.txt log.real.csv

json parking.json properties.csv population.txt log.real.json

Pre-loading files to run program faster when it's done...This might take a few minutes vary mainly depending on memory size of your machine...

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

1

1526206

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

2

19102:  6.9347

19103:  4.9118

19104:  1.2435

19106:  4.1227

19107:  6.2616

19111:  0.0401

19114:  0.0021

19118:  0.3168

19119:  0.0609

19120:  0.1605

19121:  0.2897

19122:  0.1353

19123:  1.9564

19124:  0.1740

19125:  0.1098

19126:  0.0764

19127:  1.9611

19128:  0.0797

19129:  0.3235

19130:  1.6743

19131:  0.0532

19132:  0.1774

19133:  0.1458

19134:  0.1140

19135:  0.0912

19136:  0.0546

19138:  0.0215

19139:  0.4214

19140:  0.3243

19141:  0.4757

19142:  0.1878

19143:  0.0909

19144:  0.2852

19145:  0.2950

19146:  0.9006

19147:  1.8546

19148:  0.3692

19149:  0.0859

19150:  0.0306

19151:  0.0505

19152:  0.0364

19153:  0.0325

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

3

Enter a zip code: 19152

262572

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

3

Enter a zip code: 19104

959825

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

4

Enter a zip code: 19152

1890

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

4

Enter a zip code: 19104

5295

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

4

Enter a zip code: 19103

7791

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

5

Enter a zip code: 19152

82092

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

5

Enter a zip code: 19104

219688

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

6

Wrong input, please re-run the program, enter a number between 0 to 6.

java.lang.NullPointerException

at [edu.upenn.cit594.processor.StatisticalComputer.computeCovariance](http://edu.upenn.cit594.processor.StatisticalComputer.computeCovariance)(StatisticalComputer.java:19)

at edu.upenn.cit594.processor.PropertyProcessor.fineMktValueCorrelation(PropertyProcessor.java:122)

at edu.upenn.cit594.ui.UserInterface.correlationCoefficientOfFineAndMarketValue(UserInterface.java:164)

at edu.upenn.cit594.ui.UserInterface.run(UserInterface.java:67)

at edu.upenn.cit594.ui.UserInterface.run(UserInterface.java:64)

at edu.upenn.cit594.ui.UserInterface.run(UserInterface.java:64)

at edu.upenn.cit594.ui.UserInterface.run(UserInterface.java:60)

at edu.upenn.cit594.ui.UserInterface.run(UserInterface.java:60)

at edu.upenn.cit594.ui.UserInterface.run(UserInterface.java:60)

at edu.upenn.cit594.ui.UserInterface.run(UserInterface.java:56)

at edu.upenn.cit594.ui.UserInterface.run(UserInterface.java:56)

at edu.upenn.cit594.ui.UserInterface.run(UserInterface.java:52)

at edu.upenn.cit594.ui.UserInterface.run(UserInterface.java:48)

at edu.upenn.cit594.ui.UserInterface.start(UserInterface.java:30)

at edu.upenn.cit594.Main.main(Main.java:75)

JSON VERSION Testing Result

Pre-loading files to run program faster when it's done...This might take a few minutes vary mainly depending on memory size of your machine...

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

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Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

1

1526206

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

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Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

2

19102:  6.9347

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19111:  0.0401

19114:  0.0021

19118:  0.3168

19119:  0.0609

19120:  0.1605

19121:  0.2897

19122:  0.1353

19123:  1.9564

19124:  0.1740

19125:  0.1098

19126:  0.0764

19127:  1.9611

19128:  0.0797

19129:  0.3235

19130:  1.6743

19131:  0.0532

19132:  0.1774

19133:  0.1458

19134:  0.1140

19135:  0.0912

19136:  0.0546

19138:  0.0215

19139:  0.4214

19140:  0.3243

19141:  0.4757

19142:  0.1878

19143:  0.0909

19144:  0.2852

19145:  0.2950

19146:  0.9006

19147:  1.8546

19148:  0.3692

19149:  0.0859

19150:  0.0306

19151:  0.0505

19152:  0.0364

19153:  0.0325

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

3

Enter a zip code: 19152

262572

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

3

Enter a zip code: 19104

959825

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

4

Enter a zip code: 19152

1890

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

4

Enter a zip code: 19104

5295

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

5

Enter a zip code: 19152

82092

Enter 0: exit

Enter 1: Total Population for All ZIP Codes

Enter 2: Total Fines Per Capita

Enter 3: Average Market Value

Enter 4: Average Total Livable Area

Enter 5: Total Residential Market Value Per Capita

Enter 6: Cross correlation Coefficient betWeen Fine And MarketValue Per Capita

0