Using Data Set for Data Science Analysis

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Objectives

The following is an example of how to use the Live Editor to accelerate exploratory programming. This example demonstrates how you can use the Live Editor to:

- See output together with the code that produced it.
- Divide your program into sections to evaluate blocks of code individually.
- Include visualizations.
- Experiment with parameter values using controls.
- Summarize your findings.

Load Highway Fatality Data

The Live Editor displays output together with the code that produced it. To run a section, go to the Live Editor tab and select the Run Section button. You can also click the blue bar that appears when you move your mouse to the left edge of a section.

In this example, we explore some highway fatality data. Start by loading the data. The variables are shown as the column headers of the table.

```
load fatalities
fatalities(1:10,:)
```

ans=*10×8 table*

	longitude	latitude	deaths	drivers	vehicles	vehicleMiles	alcoholRelated	urbanPopulatic
Wyoming	-107.56	43.033	164	380.18	671.53	9261	54	65.226
District_of_Columbia	-77.027	38.892	43	349.12	240.4	3742	12	100
Vermont	-72.556	44.043	98	550.46	551.52	7855	20	38.196
North_Dakota	-99.5	47.469	100	461.78	721.84	7594	35	55.807
South_Dakota	-99.679	44.272	197	563.3	882.77	8784	76	51.923
Delaware	-75.494	39.107	134	533.94	728.52	9301	48	80.021
Montana	-110.58	46.867	229	712.88	1056.7	11207	100	54.031
Rhode_Island	-71.434	41.589	83	741.84	834.5	8473	41	90.936
New_Hampshire	-71.559	43.908	171	985.77	1244.6	13216	51	59.181
Maine	-69.081	44.886	194	984.83	1106.8	14948	58	40.206

Calculate Fatality Rates

The Live Editor allows you to divide your program into sections containing text, code, and output. To create a new section, go to the Live Editor tab and click the Section Break button. The code in a section can be run independently, which makes it easy to explore ideas as you write your program.

Calculate the fatality rate per one million vehicle miles. From these values we can find the states with the lowest and highest fatality rates.

```
states = fatalities.Properties.RowNames;
rate = fatalities.deaths./fatalities.vehicleMiles;
[~, minIdx] = min(rate);                % Minimum accident rate
[~, maxIdx] = max(rate);                % Maximum accident rate
disp([states{minIdx} ' has the lowest fatality rate at ' num2str(rate(minIdx))])
```

```
Massachusetts has the lowest fatality rate at 0.0086907
```

```
disp([states{maxIdx} ' has the highest fatality rate at ' num2str(rate(maxIdx))])
```

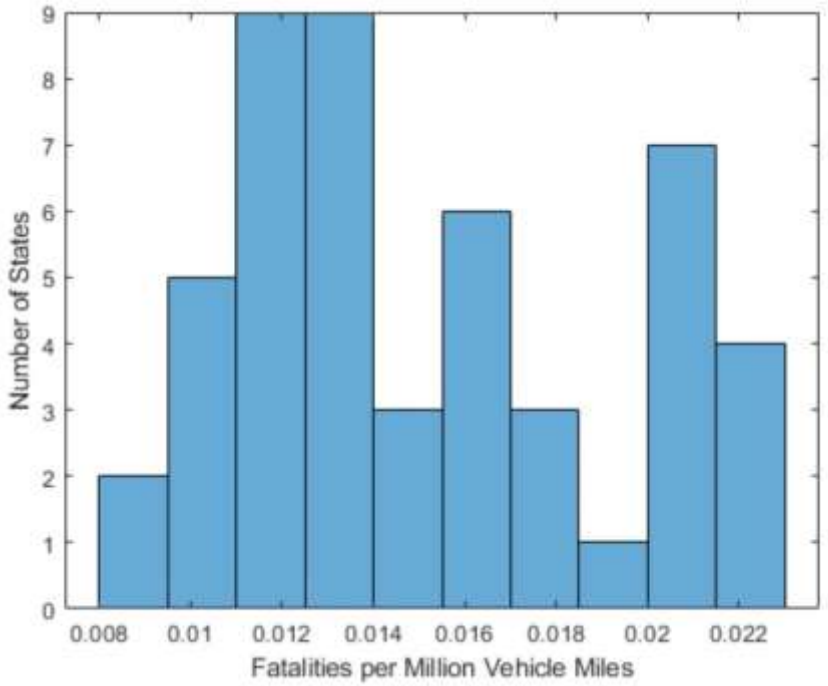
```
Mississippi has the highest fatality rate at 0.022825
```

Distribution of Fatalities

You can include visualizations in your program. Like output, plots and figures appear together with the code that produced them.

We can use a bar chart to see the distribution of fatality rates among the states. **There are 11 states that have a fatality rate greater than 0.02 per million vehicle miles.**

```
histogram(rate,10)
xlabel('Fatalities per Million Vehicle Miles')
ylabel('Number of States')
```



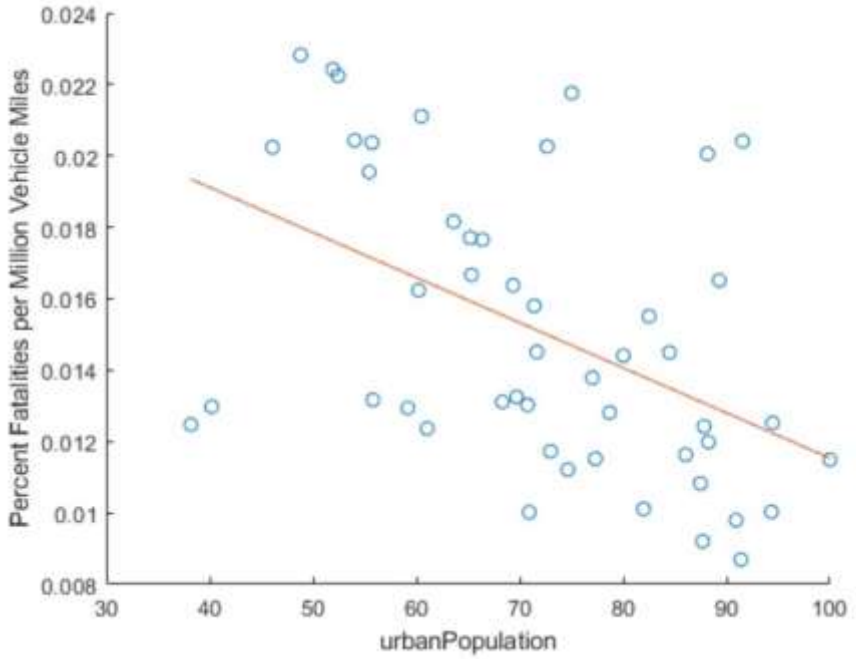
Find Correlations in the Data

You can explore your data quickly in the Live Editor by experimenting with parameter values to see how your results will change. Add controls to change parameter values interactively. To add controls, go to the Live Editor tab, click the Controls button, and select from the available options.

We can experiment with the data to see if any of the variables in the table are correlated with highway fatalities. For example, **it appears that highway fatality rates are lower in states with a higher percentage urban population.**

```
dataToPlot = urbanPopulation ;
close                                   % Close any open figures
scatter(fatalities.(dataToPlot),rate)        % Plot fatalities vs. selected variable
xlabel(dataToPlot)
ylabel('Percent Fatalities per Million Vehicle Miles')

hold on
xmin = min(fatalities.(dataToPlot));
xmax = max(fatalities.(dataToPlot));
p = polyfit(fatalities.(dataToPlot),rate,1);  % Calculate & plot least squares line
plot([xmin xmax], polyval(p,[xmin xmax]))
```

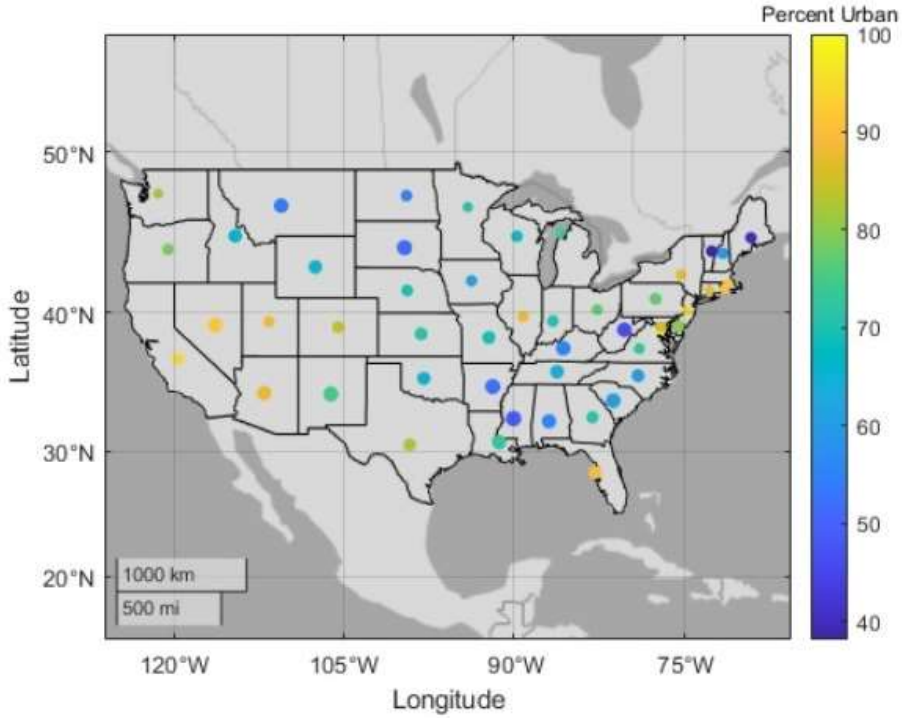


Plot Fatalities and Urbanization on a US Map

Summarize your results and share your live script with your colleagues. Using your live script, they can recreate and extend **your analysis**. You can also save your analysis as HTML, Microsoft® Word, or PDF documents for publication.

Based on this analysis, we can summarize our findings using a plot of fatality rates and urban population on a map of the continental United States.

```
load usastates.mat
figure
geoplot([usastates.Lat], [usastates.Lon], 'black')
geobasemap darkwater
hold on
geoscatter(fatalities.latitude,fatalities.longitude,2000*rate,fatalities.urbanPopulation,'filled')
c = colorbar;
title(c,'Percent Urban')
```



Link for Live Editor:

https://www.mathworks.com/help/matlab/matlab_prog/live-editor-exploratory-programming.html

Click “Try This Example” button after link above to run live version

ThankYou