

SMART COMMUTE RETHINK YOUR RIDE

TEAM 25



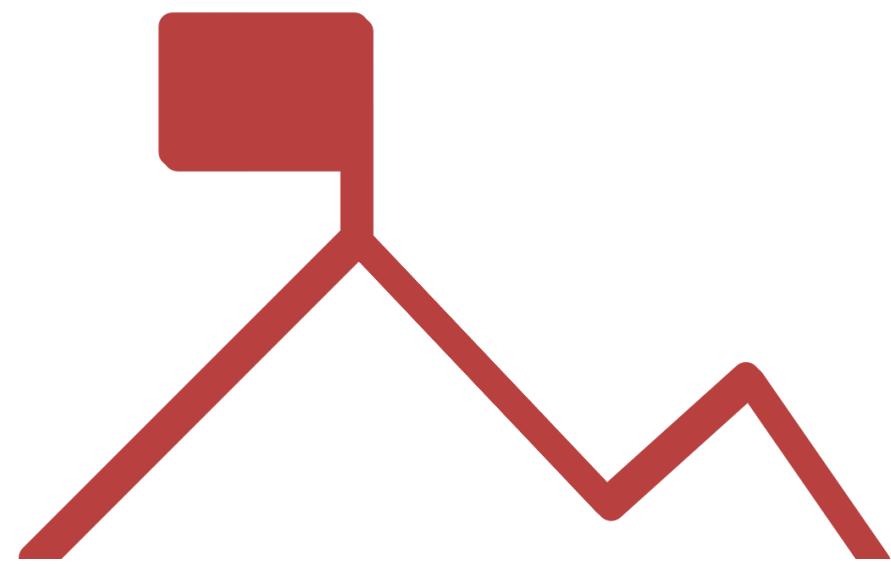
Data Challenge | Feb. 2020

50,000

C O M M U N I T Y

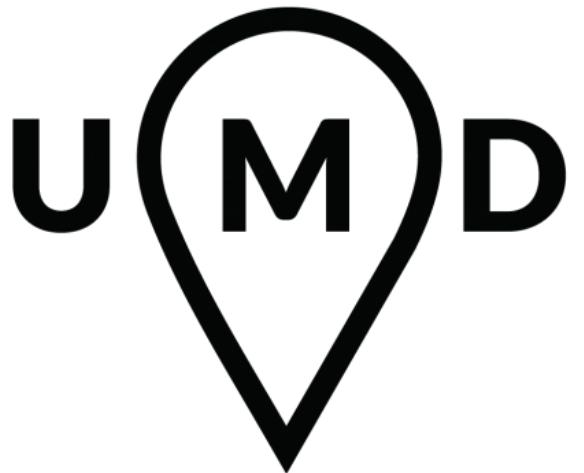


**The University of Maryland Department of
Transportation Services (DOTS)** provides a full range of parking and transportation services to a diverse community of students, faculty and staff in the City of College Park.



MISSION

"Strives to provide access to safe, cost-effective, sustainable and innovative services that anticipate the growing needs of our campus community"



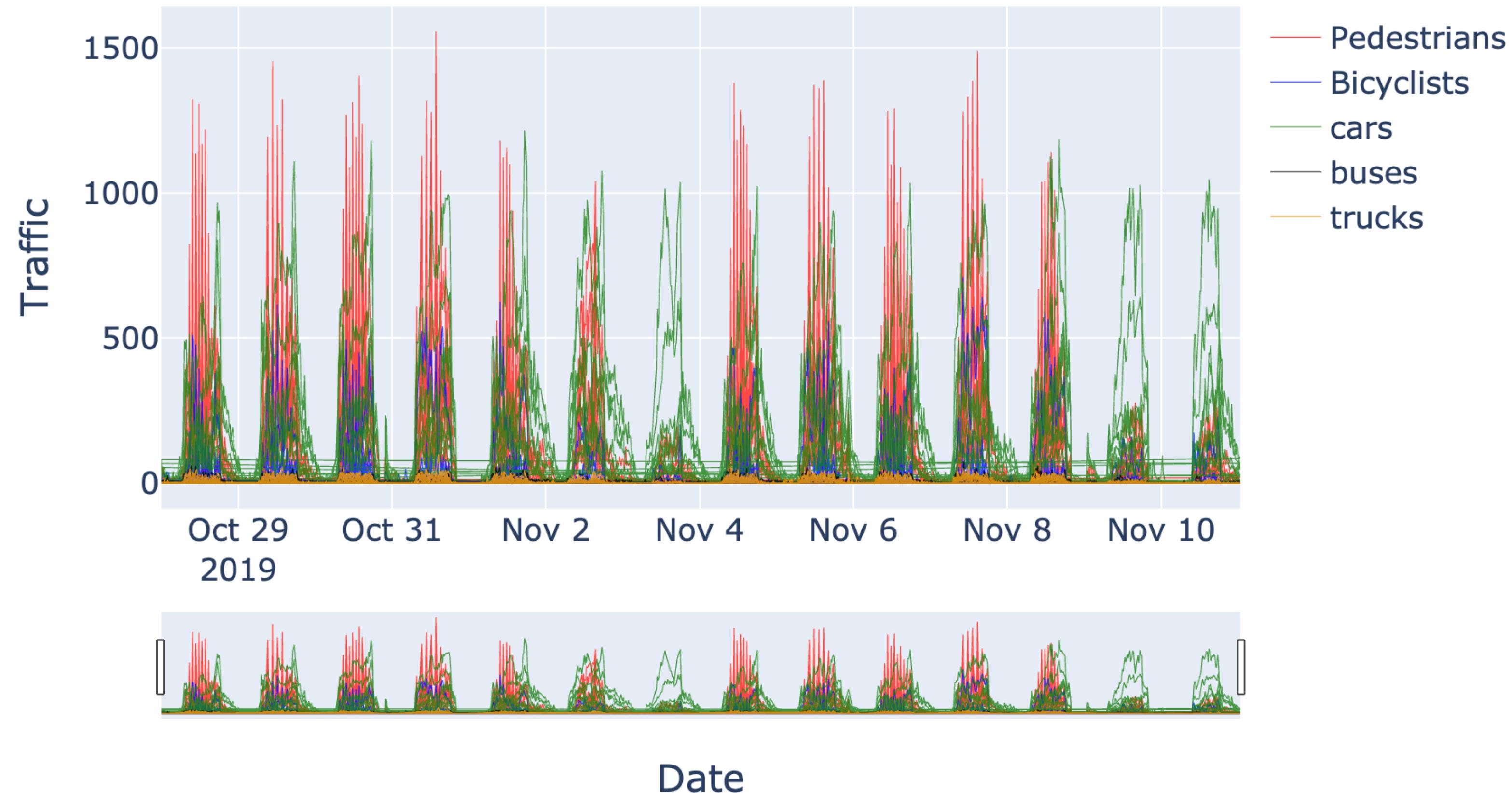
A B O U T P R O J E C T

Scope:

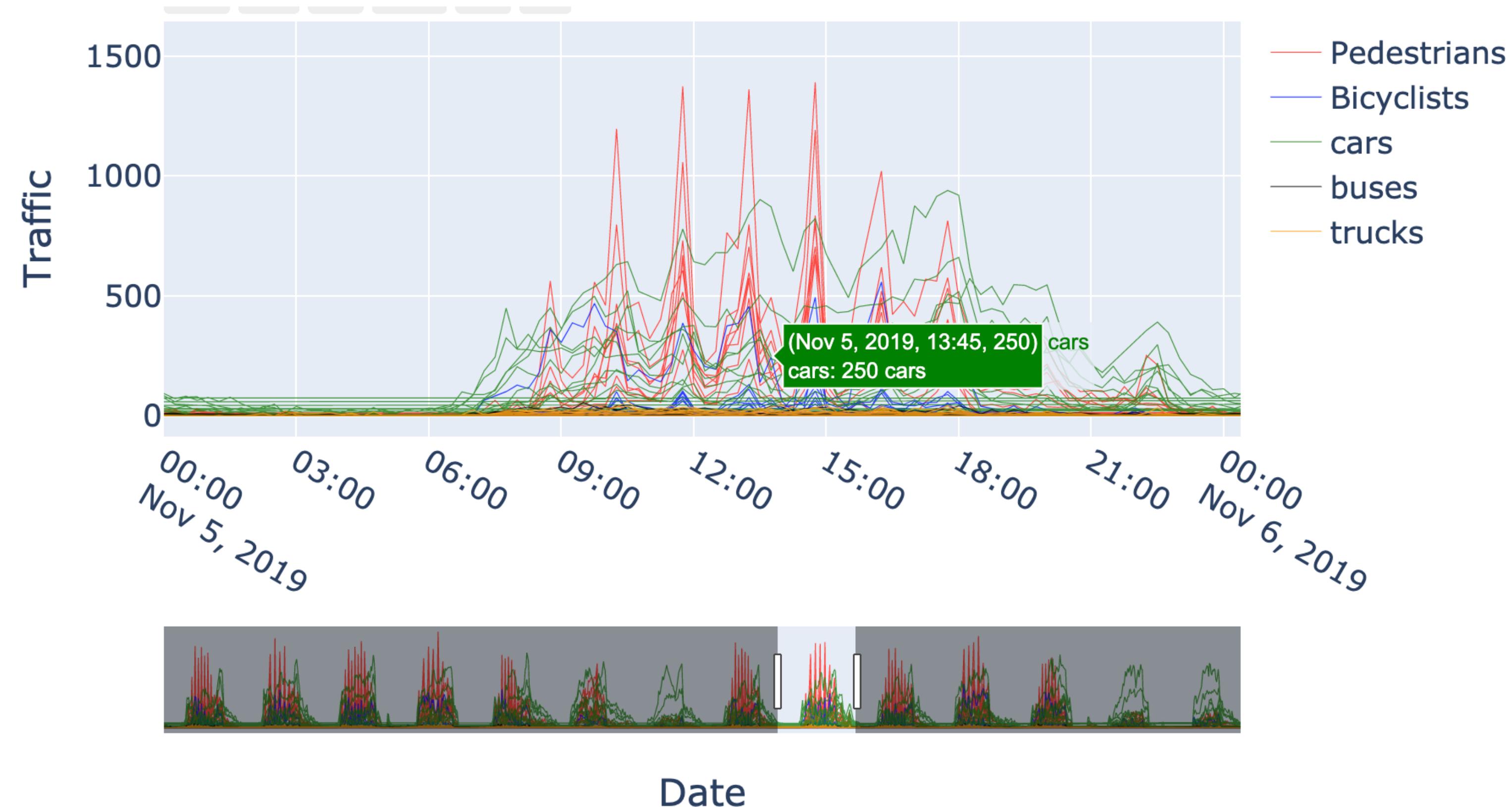
- Observe the time trend of traffic on campus by modes
- Identify and explore the influencing factors
- Predict the traffic in the future

Tools: Excel, Python, ArcGIS, and R

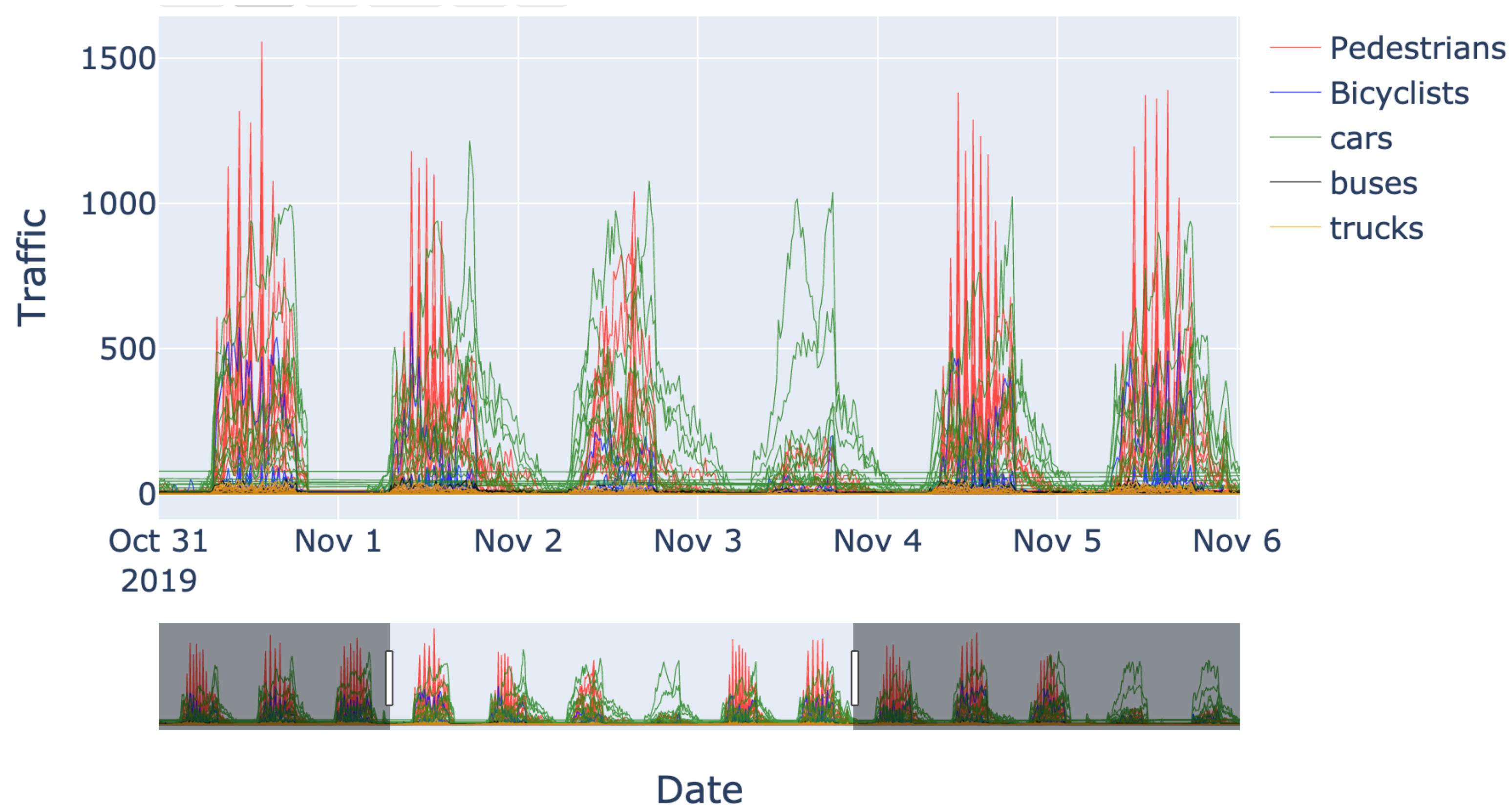
TIME TREND BY MODE (OVERALL)



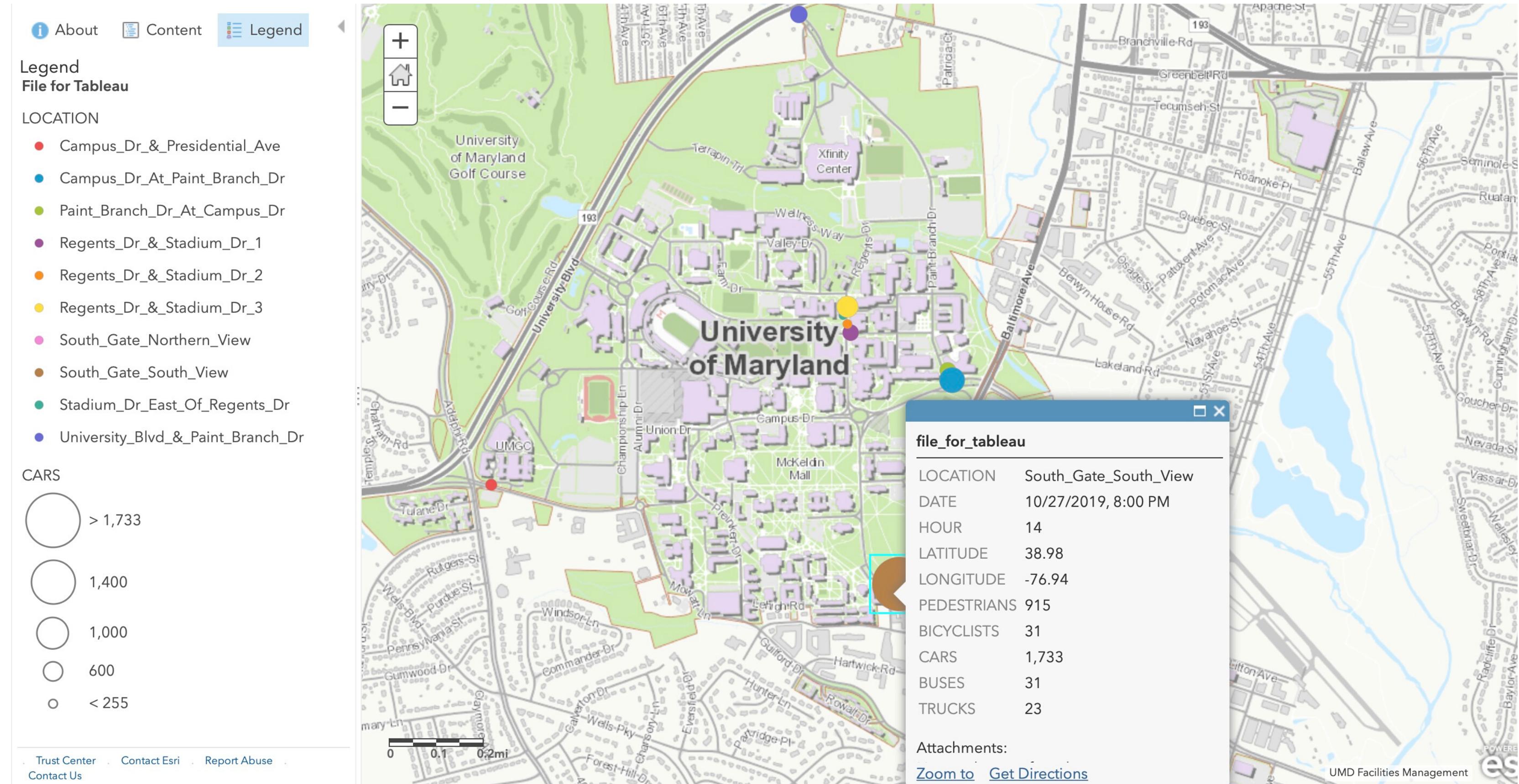
TIME TREND BY MODE (DAILY)



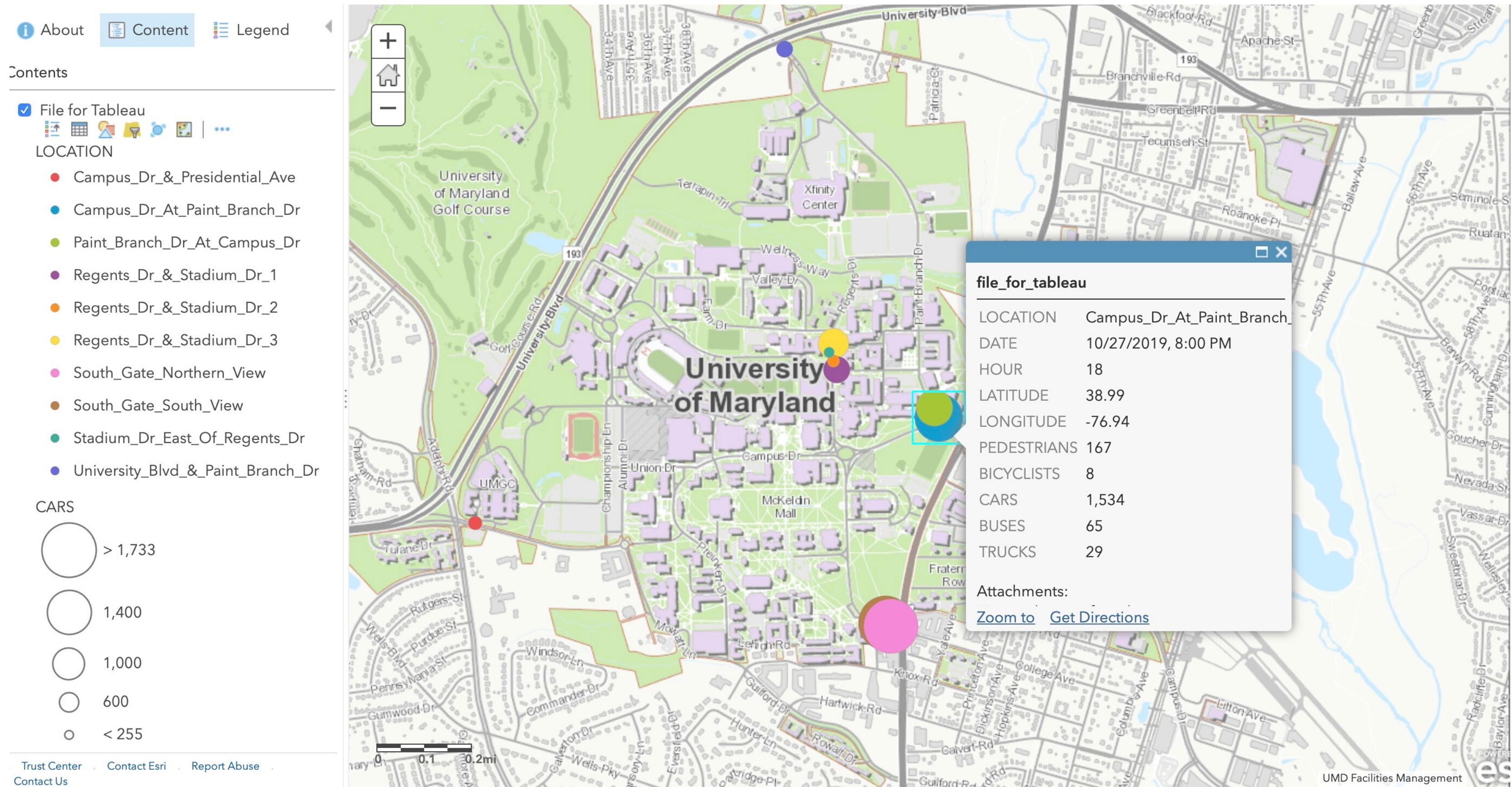
TIME TREND BY MODE (WEEKLY)



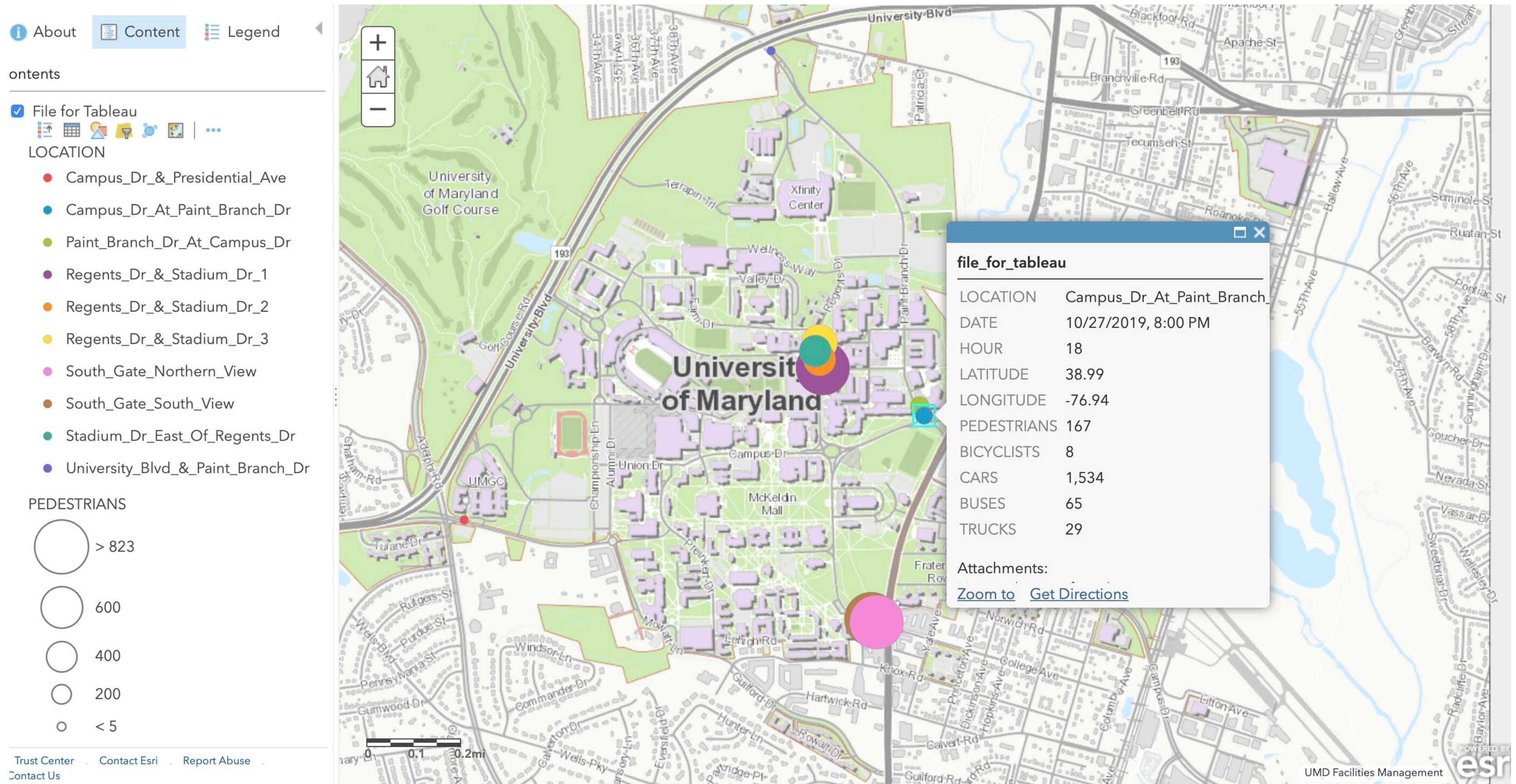
TIME TREND BY LOCATION



TIME TREND BY LOCATION



TIME TREND BY LOCATION



REGRESSION MODEL (BICYCLISTS)

Call:

```
lm(formula = BICYCLISTS ~ Temperature.F + Humidity + Wind.Speed.mph +
  Condition + IsGameTime + Prime.Time, data = dotTrain)
```

Residuals:

| Min | 1Q | Median | 3Q | Max |
|--------|--------|--------|------|--------|
| -57.66 | -17.32 | -8.67 | 0.05 | 688.19 |

Coefficients:

| | Estimate | Std. Error | t value | Pr(> t) |
|--------------------------------|-----------|------------|----------|--------------|
| (Intercept) | 4.85742 | 4.77356 | 1.018 | 0.308907 |
| Temperature.F | 0.94895 | 0.06320 | 15.015 | < 2e-16 *** |
| Humidity | -0.48362 | 0.03719 | -13.005 | < 2e-16 *** |
| Wind.Speed.mph | -0.34372 | 0.16902 | -2.034 | 0.042020 * |
| ConditionCloudy / Windy | -38.98493 | 9.61995 | -4.053 | 5.10e-05 *** |
| ConditionFair | -13.37522 | 1.68495 | -7.938 | 2.26e-15 *** |
| ConditionFair / Windy | -0.52670 | 5.58545 | -0.094 | 0.924874 |
| ConditionHeavy T-Storm | -30.72693 | 9.46854 | -3.245 | 0.001177 ** |
| ConditionLight Rain | -2.59825 | 2.34191 | -1.109 | 0.267257 |
| ConditionLight Rain / Windy | -39.53541 | 9.94050 | -3.977 | 7.02e-05 *** |
| ConditionMostly Cloudy | -4.59616 | 1.71030 | -2.687 | 0.007214 ** |
| ConditionPartly Cloudy | -7.55186 | 1.97036 | -3.833 | 0.000127 *** |
| ConditionPartly Cloudy / Windy | -28.38566 | 9.04320 | -3.139 | 0.001700 ** |
| ConditionT-Storm | -16.47433 | 8.53054 | -1.931 | 0.053482 . |
| IsGameTime | -2.91765 | 2.08464 | -1.400 | 0.161664 |
| Prime.Time | 18.86898 | 2.60980 | 7.230 | 5.16e-13 *** |
| --- | | | | |
| Signif. codes: | 0 ‘***’ | 0.001 ‘**’ | 0.01 ‘*’ | 0.05 ‘.’ |
| | 0.1 ‘ ’ | 1 | | |

Residual standard error: 51.94 on 10736 degrees of freedom

Multiple R-squared: 0.06056, Adjusted R-squared: 0.05925

F-statistic: 46.14 on 15 and 10736 DF, p-value: < 2.2e-16

REGRESSION MODEL (PEDESTRIANS)

Call:

```
lm(formula = PEDESTRIANS ~ Temperature.F + Humidity + Wind.Speed.mph +
  Condition + IsGameTime + Prime.Time, data = dotTrain)
```

Residuals:

| Min | 1Q | Median | 3Q | Max |
|---------|--------|--------|-------|---------|
| -253.10 | -67.30 | -27.24 | 20.89 | 1349.57 |

Coefficients:

| | Estimate | Std. Error | t value | Pr(> t) |
|--------------------------------|-----------|------------|---------|--------------|
| (Intercept) | -12.5070 | 12.9840 | -0.963 | 0.335436 |
| Temperature.F | 5.1014 | 0.1719 | 29.676 | < 2e-16 *** |
| Humidity | -2.3366 | 0.1011 | -23.100 | < 2e-16 *** |
| Wind.Speed.mph | -1.8453 | 0.4597 | -4.014 | 6.02e-05 *** |
| ConditionCloudy / Windy | -165.4741 | 26.1661 | -6.324 | 2.65e-10 *** |
| ConditionFair | -40.7282 | 4.5830 | -8.887 | < 2e-16 *** |
| ConditionFair / Windy | -22.3692 | 15.1923 | -1.472 | 0.140942 |
| ConditionHeavy T-Storm | -150.5271 | 25.7542 | -5.845 | 5.22e-09 *** |
| ConditionLight Rain | -24.1105 | 6.3699 | -3.785 | 0.000155 *** |
| ConditionLight Rain / Windy | -193.9329 | 27.0379 | -7.173 | 7.84e-13 *** |
| ConditionMostly Cloudy | -15.6906 | 4.6520 | -3.373 | 0.000746 *** |
| ConditionPartly Cloudy | -27.9366 | 5.3593 | -5.213 | 1.90e-07 *** |
| ConditionPartly Cloudy / Windy | -127.1476 | 24.5973 | -5.169 | 2.39e-07 *** |
| ConditionT-Storm | -74.4340 | 23.2029 | -3.208 | 0.001341 ** |
| IsGameTime | 8.5896 | 5.6702 | 1.515 | 0.129832 |
| Prime.Time | 68.1044 | 7.0986 | 9.594 | < 2e-16 *** |

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 141.3 on 10736 degrees of freedom

Multiple R-squared: 0.1621, Adjusted R-squared: 0.1609

F-statistic: 138.4 on 15 and 10736 DF, p-value: < 2.2e-16

REGRESSION MODEL (TRUCKS)

Call:

```
lm(formula = TRUCKS ~ Temperature.F + Humidity + Wind.Speed.mph +
  Condition + IsGameTime + Prime.Time, data = dotTrain)
```

Residuals:

| Min | 1Q | Median | 3Q | Max |
|---------|--------|--------|-------|--------|
| -17.739 | -4.321 | -1.642 | 2.010 | 90.035 |

Coefficients:

| | Estimate | Std. Error | t value | Pr(> t) |
|--------------------------------|------------|------------|---------|--------------|
| (Intercept) | -1.517355 | 0.673538 | -2.253 | 0.024291 * |
| Temperature.F | 0.314334 | 0.008917 | 35.249 | < 2e-16 *** |
| Humidity | -0.114246 | 0.005247 | -21.774 | < 2e-16 *** |
| Wind.Speed.mph | -0.181606 | 0.023849 | -7.615 | 2.86e-14 *** |
| ConditionCloudy / Windy | -12.202252 | 1.357351 | -8.990 | < 2e-16 *** |
| ConditionFair | -2.434642 | 0.237743 | -10.241 | < 2e-16 *** |
| ConditionFair / Windy | 0.377103 | 0.788093 | 0.479 | 0.632304 |
| ConditionHeavy T-Storm | -11.165335 | 1.335987 | -8.357 | < 2e-16 *** |
| ConditionLight Rain | -1.840499 | 0.330437 | -5.570 | 2.61e-08 *** |
| ConditionLight Rain / Windy | -13.326092 | 1.402579 | -9.501 | < 2e-16 *** |
| ConditionMostly Cloudy | -0.925187 | 0.241319 | -3.834 | 0.000127 *** |
| ConditionPartly Cloudy | -1.207632 | 0.278013 | -4.344 | 1.41e-05 *** |
| ConditionPartly Cloudy / Windy | -8.438148 | 1.275972 | -6.613 | 3.94e-11 *** |
| ConditionT-Storm | -6.536166 | 1.203638 | -5.430 | 5.75e-08 *** |
| IsGameTime | -0.900013 | 0.294138 | -3.060 | 0.002220 ** |
| Prime.Time | 7.463016 | 0.368236 | 20.267 | < 2e-16 *** |

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 7.328 on 10736 degrees of freedom

Multiple R-squared: 0.2325, Adjusted R-squared: 0.2314

F-statistic: 216.8 on 15 and 10736 DF, p-value: < 2.2e-16

REGRESSION MODEL (BUSES)

Call:

```
lm(formula = BUSES ~ Temperature.F + Humidity + Wind.Speed.mph +
  Condition + IsGameTime + Prime.Time, data = dotTrain)
```

Residuals:

| Min | 1Q | Median | 3Q | Max |
|---------|--------|--------|-------|--------|
| -11.951 | -3.558 | -1.682 | 1.222 | 69.502 |

Coefficients:

| | Estimate | Std. Error | t value | Pr(> t) |
|--------------------------------|-----------|------------|---------|--------------|
| (Intercept) | -1.533314 | 0.598473 | -2.562 | 0.010419 * |
| Temperature.F | 0.215167 | 0.007924 | 27.155 | < 2e-16 *** |
| Humidity | -0.069969 | 0.004662 | -15.008 | < 2e-16 *** |
| Wind.Speed.mph | -0.109160 | 0.021191 | -5.151 | 2.63e-07 *** |
| ConditionCloudy / Windy | -6.005140 | 1.206076 | -4.979 | 6.49e-07 *** |
| ConditionFair | -0.815384 | 0.211247 | -3.860 | 0.000114 *** |
| ConditionFair / Windy | 2.828095 | 0.700262 | 4.039 | 5.41e-05 *** |
| ConditionHeavy T-Storm | -7.912654 | 1.187093 | -6.666 | 2.77e-11 *** |
| ConditionLight Rain | -1.139098 | 0.293610 | -3.880 | 0.000105 *** |
| ConditionLight Rain / Windy | -9.283368 | 1.246264 | -7.449 | 1.01e-13 *** |
| ConditionMostly Cloudy | 0.215192 | 0.214425 | 1.004 | 0.315605 |
| ConditionPartly Cloudy | 0.172005 | 0.247029 | 0.696 | 0.486260 |
| ConditionPartly Cloudy / Windy | -5.723402 | 1.133767 | -5.048 | 4.53e-07 *** |
| ConditionT-Storm | -4.760380 | 1.069494 | -4.451 | 8.63e-06 *** |
| IsGameTime | -0.357798 | 0.261357 | -1.369 | 0.171027 |
| Prime.Time | 3.548771 | 0.327197 | 10.846 | < 2e-16 *** |

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 6.511 on 10736 degrees of freedom

Multiple R-squared: 0.1249, Adjusted R-squared: 0.1237

F-statistic: 102.2 on 15 and 10736 DF, p-value: < 2.2e-16

REGRESSION MODEL (CARS)

Call:

```
lm(formula = CARS ~ Temperature.F + Humidity + Wind.Speed.mph +  
Condition + IsGameTime + Prime.Time, data = dotTrain)
```

Residuals:

| Min | 1Q | Median | 3Q | Max |
|---------|--------|--------|-------|---------|
| -362.73 | -96.20 | -44.37 | 39.88 | 1049.89 |

Coefficients:

| | Estimate | Std. Error | t value | Pr(> t) |
|--------------------------------|-----------|------------|---------|--------------|
| (Intercept) | 67.2186 | 15.0391 | 4.470 | 7.92e-06 *** |
| Temperature.F | 5.9222 | 0.1991 | 29.743 | < 2e-16 *** |
| Humidity | -3.3089 | 0.1172 | -28.243 | < 2e-16 *** |
| Wind.Speed.mph | -4.3540 | 0.5325 | -8.176 | 3.25e-16 *** |
| ConditionCloudy / Windy | -169.2942 | 30.3075 | -5.586 | 2.38e-08 *** |
| ConditionFair | -34.8216 | 5.3084 | -6.560 | 5.64e-11 *** |
| ConditionFair / Windy | -44.3364 | 17.5969 | -2.520 | 0.01176 * |
| ConditionHeavy T-Storm | -199.9976 | 29.8305 | -6.704 | 2.12e-11 *** |
| ConditionLight Rain | -11.2320 | 7.3781 | -1.522 | 0.12796 |
| ConditionLight Rain / Windy | -257.1210 | 31.3174 | -8.210 | 2.46e-16 *** |
| ConditionMostly Cloudy | 1.7541 | 5.3883 | 0.326 | 0.74477 |
| ConditionPartly Cloudy | -16.6465 | 6.2076 | -2.682 | 0.00734 ** |
| ConditionPartly Cloudy / Windy | -195.0974 | 28.4905 | -6.848 | 7.91e-12 *** |
| ConditionT-Storm | -110.4696 | 26.8754 | -4.110 | 3.98e-05 *** |
| IsGameTime | 38.9598 | 6.5676 | 5.932 | 3.08e-09 *** |
| Prime.Time | 33.0706 | 8.2222 | 4.022 | 5.81e-05 *** |
| --- | | | | |

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 163.6 on 10736 degrees of freedom

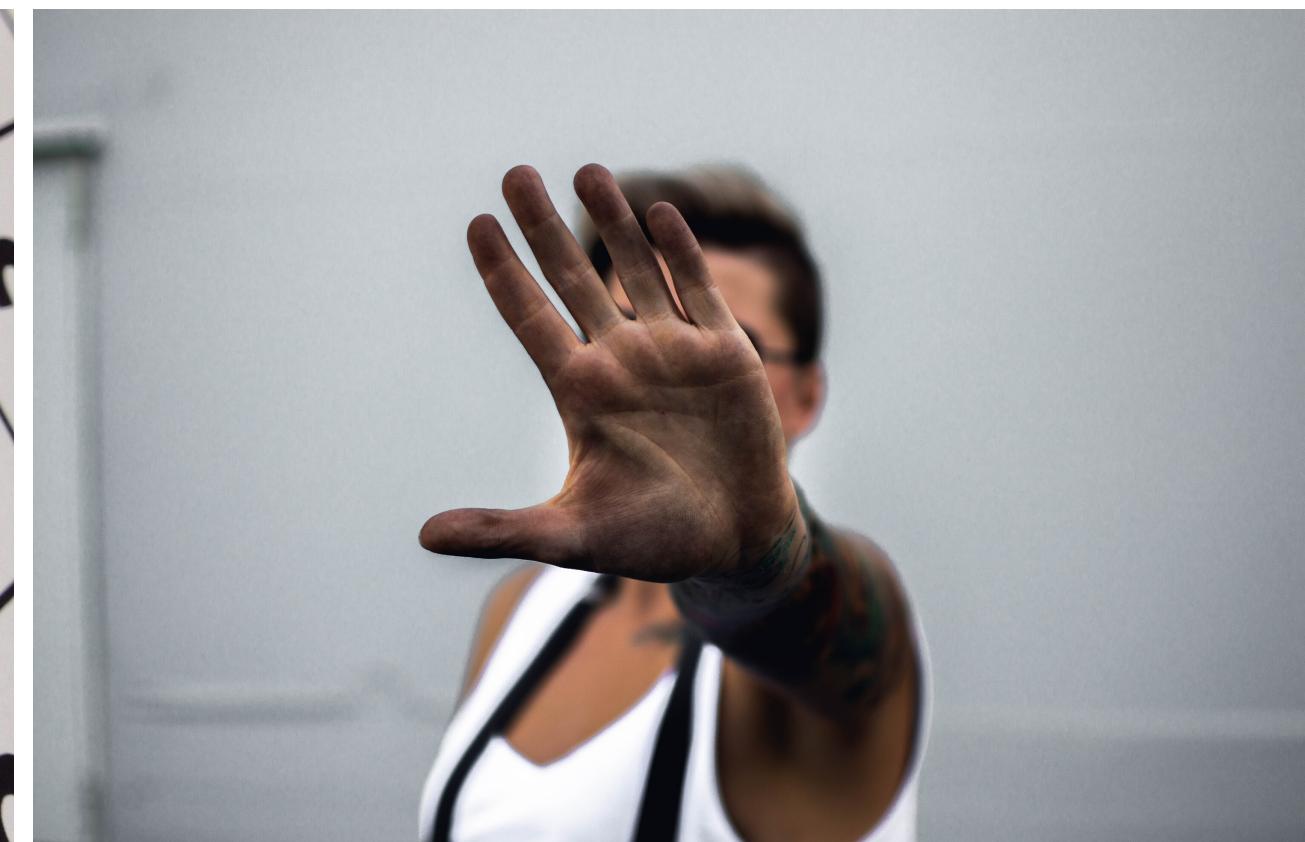
Multiple R-squared: 0.17, Adjusted R-squared: 0.1688

F-statistic: 146.6 on 15 and 10736 DF, p-value: < 2.2e-16

SUGGESTIONS



ADJUST CLASS
SCHEDULE



RESTRICT AUTOMOBILE
ACCESS IN RUSH HOUR



PROVIDE MORE
SHUTTLES



THANK YOU!

SMART COMMUTE IS OUR PRIORITY.