

Understanding the regional traffic patterns

By **Team DC20040** 

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### 102 hours

D.C. area car commuter spends stuck in traffic per year

# 38 gallons

Gasoline wasted by car commuter per year

\$1,840

Spent per car commuter per year because of congestion

#### Introduction

#### **Our Region**

- 3,500 square miles
- 5.7 million people
- 3.3 million jobs

#### **Transportation System**

- 17,000+ lane miles of highways and major roads
- 118 miles of Metrorail and 91 Metrorail stations
- 167 miles of MARC and Virginia Railway Express commuter rail and 39 commuter rail stations

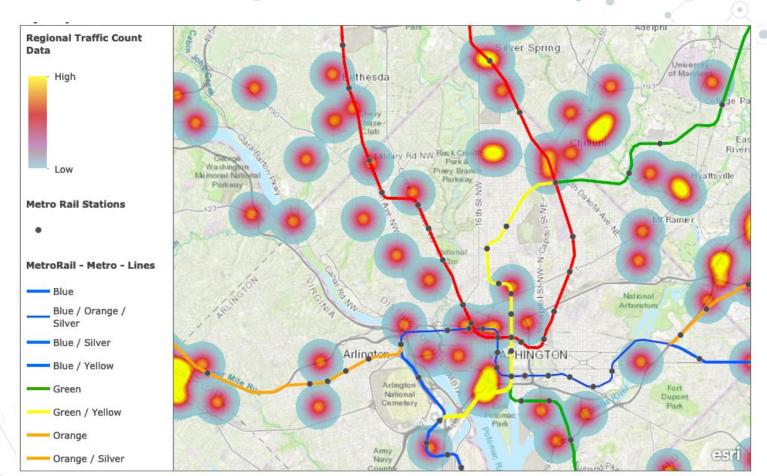
#### **Objective**

 Find the pattern of AM rush hours in DC region and come up with the recommendations for transportation planning.

# **Trends in Traffic Counts**

Let's start with the first set of slides

#### Traffic Spots vs Metro Rail Coverage



#### **Traffic Spots vs Population**

#### Regional Traffic Count Data







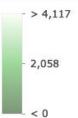




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CooperativeForecast -Cooperative Forecast -Round 9.1

#### Population 2015





#### Traffic Spots vs Employment

#### **Regional Traffic Count** Data











#### CooperativeForecast -Cooperative Forecast -Round 9.1

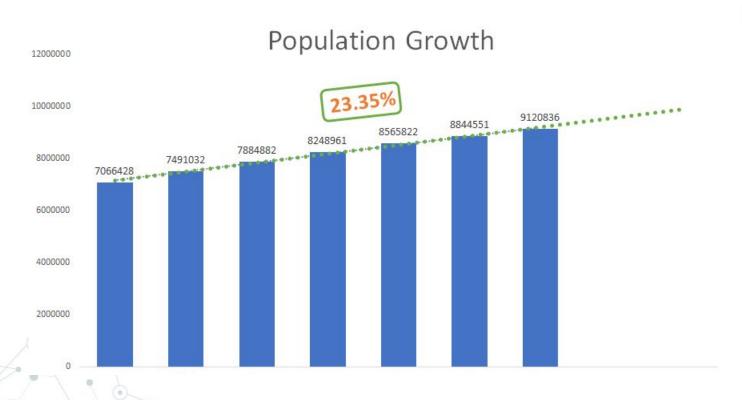
#### Employment 2015

> 3,543



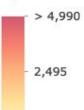


#### Projected Population growth



# CooperativeForecast Cooperative Forecast Round 9.1

Population 2040

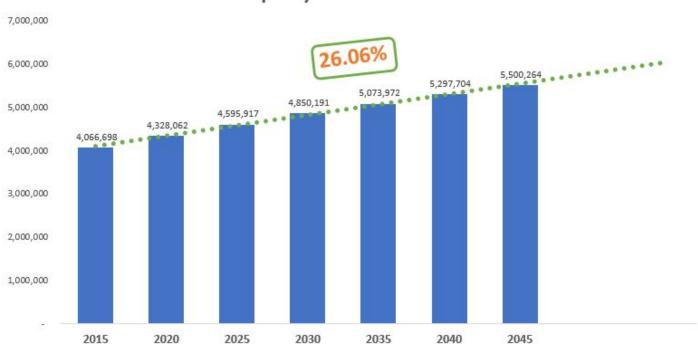


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#### **Projected Employment Growth**

#### **Employment Growth**



#### CooperativeForecast -Cooperative Forecast -Round 9.1



#### Employment 2040



< 0



# Recommendations

#### **Monitored Solutions**

- Bring Housing and jobs closer together
- Expand the Metro Coverage to reach congested areas
- Expand the express highway network
- Improve the bike lanes and walkways
- Expand the bus transit routes to cover more congested areas

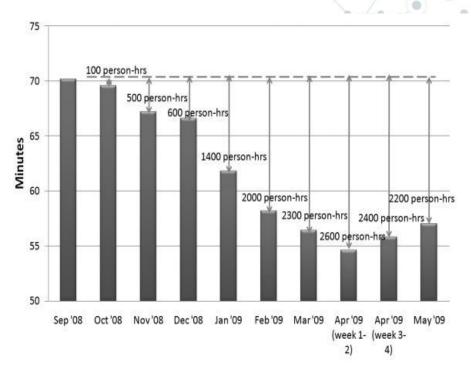
(66)

It is our choices ... that show what we truly are, far more than our abilities.

-Albus Dumbledore Headmaster Hogwarts school of Wizardry

#### **Incentivized Self-Organizing Solutions**

In the original pilot study by researchers from Stanford University, held in Bangalore from October 2008 to April 2009, the incentives system worked incredibly well. Roughly 14,000 locals were given the chance to commute outside peak hours; every time they did, they improved their odds of winning a weekly raffle that paid out prizes ranging from \$10 to \$240.



#### What about data based approaches?

- Modern vehicles generate around 25 gigabytes of data every hour
- Autonomous cars will generate even more up to 3,600 gigabytes of data per hour

#### What do we do with all this data?

Generate a network of connected vehicles that talk to each other.

The Potential of a connected car network is almost limitless!

# **Data Modelling and Analysis**

### **Data Feature Extraction**

- Transform categorical explanatory variables to dummy variables or multiple dummy variables
- Run regression; check VIF, combined variables with strong correlation.
- Check p-value, drop variables with large p-value by using domain knowledge.

#### Variables Involved in Analysis

**Independent Variables** 

<u>TotVol</u> Total volume of vehicles of all kind

Ratio of Car to Bus Ratio of Number of Cars to the number of Buses

**Dependent Variables** 

<u>Population By County</u> Population of the county in which the traffic sensor is placed for the year

2017

Metro Coverage Dummy Variable created for analysis

1 = Has Metro coverage

0 = No Metro coverage

Median Household Median value of the household incomes of the people living in that county

<u>Income</u>

Residential Dummy Variable created for analysis

1 = Residential Area

0 = Commercial Area

#### Linear regression model:

#### Looking for patterns in total volume of vehicles among counties based on population,

Regression Table	Coefficient	Standard Error	t-Value	p-Value	Confidence Interval 95%	
					Lower	Upper
Constant	1153.789382	187.2805644	6.160753441	< 0.0001	786.2269229	1521.351841
Population by county	0.002496764	0.000307499	8.119580423	< 0.0001	0.001893257	0.003100271

#### Looking for patterns in total volume of vehicles among counties based on Metro Coverage,

Regression Table	Coefficient	Standard Error	t-Value	p-Value	Confidence Interval 95%	
					Lower	Upper
Constant	1735.118151	140.294336	12.36769922	< 0.0001	1459.772274	2010.464027
Metro Coverage(1/0) = 1	1824.254018	238.4990359	7.648894726	< 0.0001	1356.168649	2292.339386

#### Linear regression model:

Looking for patterns in preference of Bus to car among counties based on population, median household income, metro coverage and type of area,

Regression Table	Coefficient	Standard Error	t-Value	p-Value	Confidence Interval 95%	
					Lower	Upper
Constant	228.059106	43.71066959	5.217469971	< 0.0001	142.2708392	313.8473728
Population by county	0.000180413	4.11781E-05	4.381289176	< 0.0001	9.95954E-05	0.000261231
Median household income	-0.000570488	0.000363592	-1.569032432	0.1170	-0.001284088	0.000143112
Metro Coverage(1/0) = 1	-135.9451895	35.79522093	-3.797858651	0.0002	-206.1982876	-65.69209126
Residential(1/0) = 1	-114.9685218	23.03463578	-4.991115246	< 0.0001	-160.1771974	-69.75984628
ALLEGE MANAGEMENT OF THE PARTY						

# Thank You!

**Questions?** 

