ACTIVE SATELLITES IN ORBIT AROUND EARTH

WHICH FACTORS BEHIND THE CHOICE OF SATELLITES LAUNCH SITES

Capstone Project

Foundations of Data Science – Springboard-

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ACTIVE SATELLITES IN ORBIT AROUND EARTH

OBJECTIFS :

Project based on R programming

- **Collecting data**
- **Data wrangling techniques**
- **Exploratory data analysis**
- **Applying machine learning algorithms**

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PROJECT OVERVIEW

This project outlines the active satellites current situation and draws up some key observations.
It will identify factors behind the choice of a satellite launch sites

Data set

- **Dataset from kaggle :** https://www.kaggle.com/ucsusa/active-satellites
- **1419 observations & 26 variables**

EXPLORATORY

Findings :

Shares

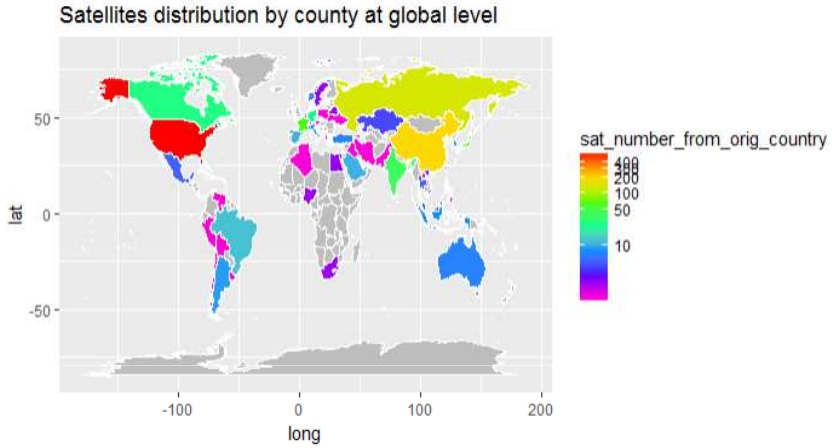
- 38.4% of satellites are under the sole USA Flag
- Chine is in second position
- 7 countries have at least 40 actives satellites on orbit
- 23 satellites are at least under the flag of two countries

Purpose of active satellites

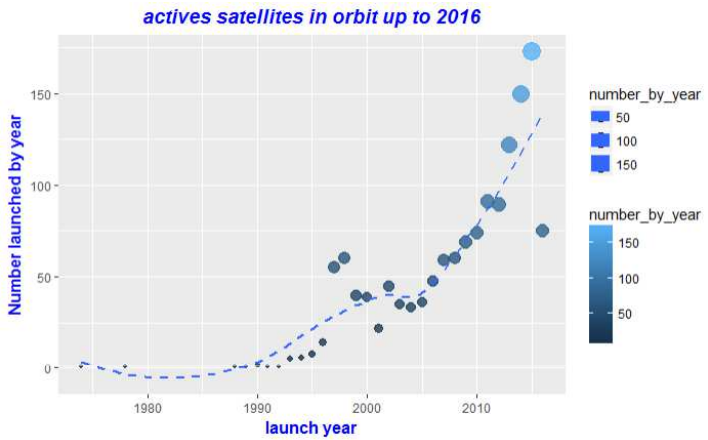
- 39 % : Commercials
- 20 % : governments
- 17 % : Military
- 7 % : civil
- 16 % : mixed activities

EXPLORATORY

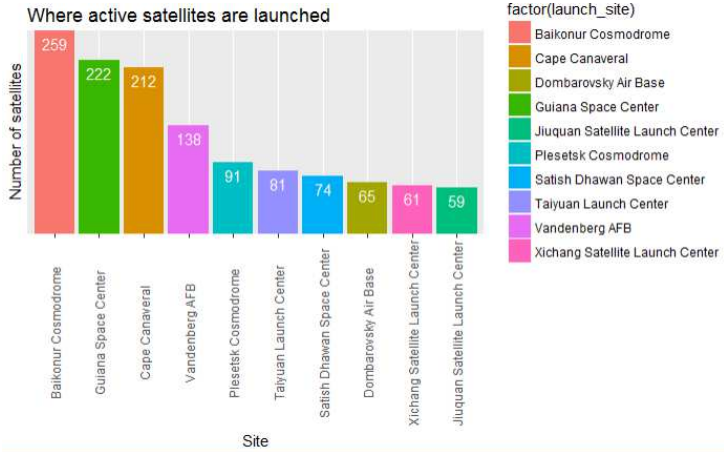
Distribution by country



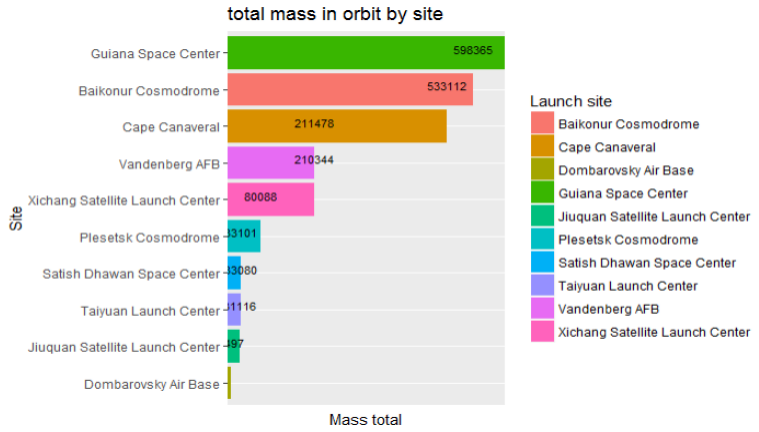
Increase in satellites since 1997



Number of satellites by launch site



The total mass in orbit by launch site



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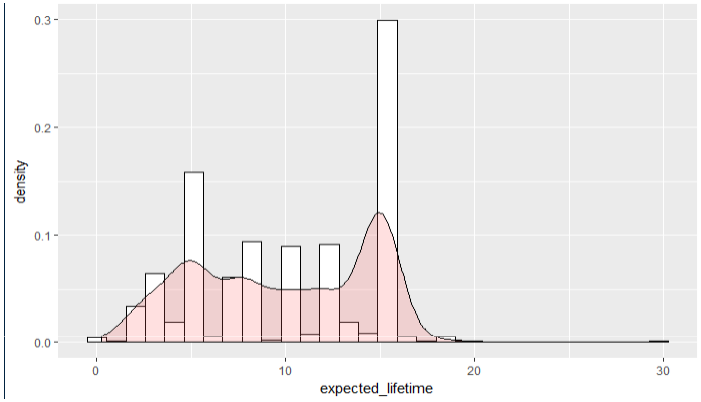
MACHINE LEARNING : MULTIPLE LINEAR REGRESSION

Findings :

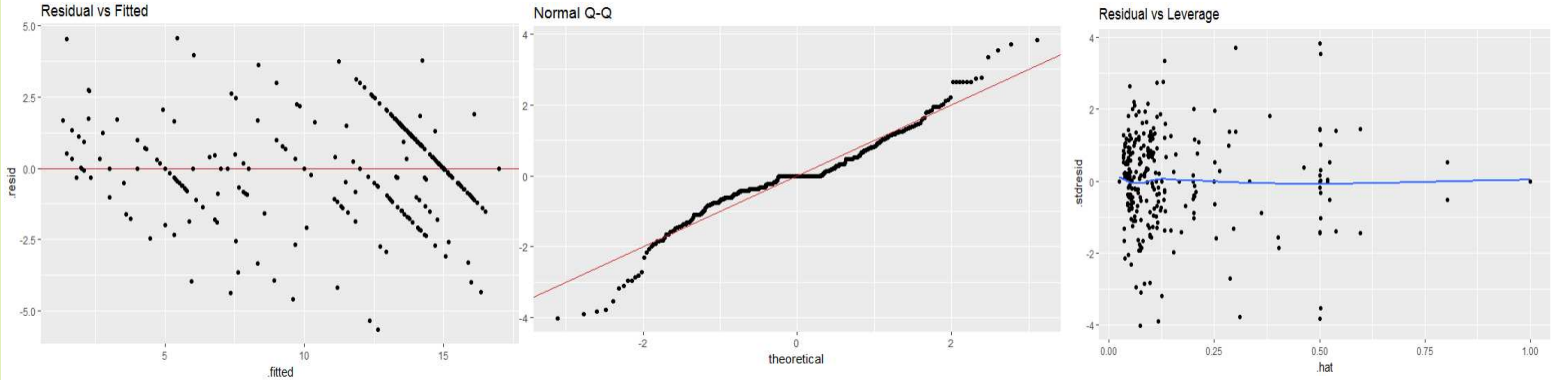
The expected life time of a satellite is highly related (90.5 percent) to its purpose , class of orbit, power and the launch vehicle




```
lm(formula = expected_lifetime ~ purpose + class_of_orbit, data =
sat_expected_life)
Residual standard error: 1.461 on 459 degrees of freedom
  (337 observations deleted due to missingness)
Multiple R-squared:  0.9046,    Adjusted R-squared:  0.8819
F-statistic: 39.92 on 109 and 459 DF,  p-value: < 2.2e-16

Analysis of Variance Table

Response: expected_lifetime
                Df Sum Sq Mean Sq F value    Pr(>F)
purpose         12 3535.1  294.59 138.024 < 2.2e-16 ***
class_of_orbit   2 2997.8 1498.90 702.274 < 2.2e-16 ***
launch_mass      1  439.5  439.50 205.916 < 2.2e-16 ***
power            1   70.8   70.81  33.175 1.545e-08 ***
launch_vehicule 93 2243.7   24.13  11.303 < 2.2e-16 ***
Residuals      459  979.7    2.13
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```



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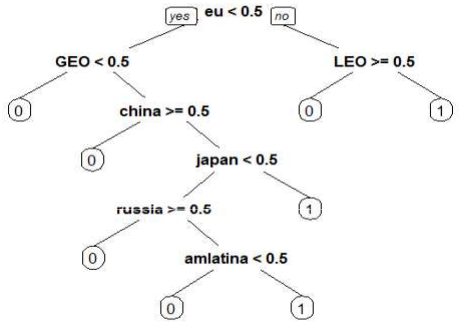
MACHINE LEARNING : CART

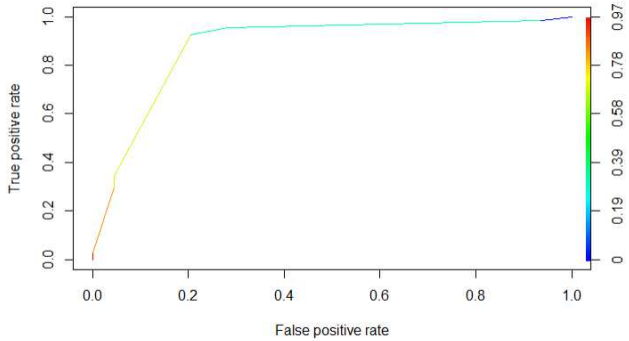
WHICH FACTORS BEHIND THE CHOICE OF SATELLITE'S SITE LAUNCH

Findings :

The choice of the launch site is highly linked to the country of the contractor and type of satellite

Choice of Guiana Site

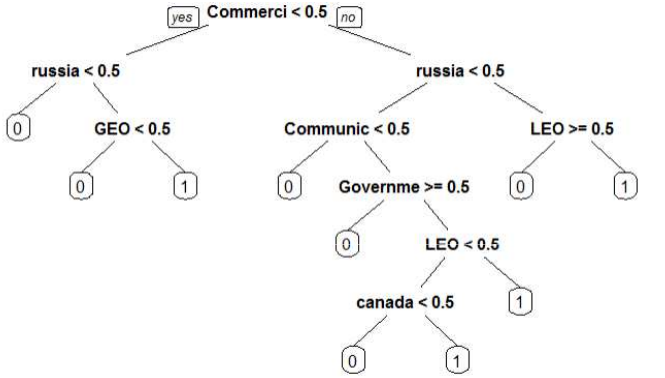


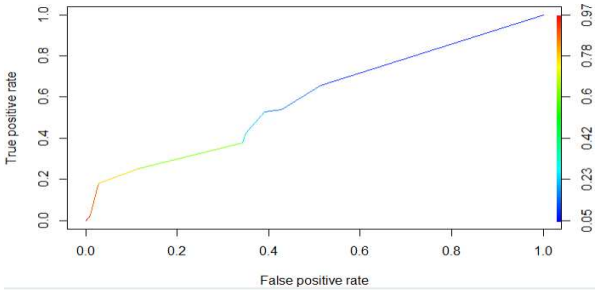


Confusion Matrix	FALSE	TRUE
0	248	64
1	5	62

AUC : 0.8793

Choice of Baikonur Site





Confusion Matrix	FALSE	TRUE
0	221	80
1	19	59

AUC : 0.5887

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End

Thanks

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