

# Machine-in-the-Loop: a Machine Learning Exploration

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## Motivation

The motivation behind this project is being able to parse through data generated data from four satellites around the globe and determine which data should be downloaded back down to Earth for further study. Since the orbits of the satellites only allow for 2% to 4% of the data to be transmitted back to Earth, a machine learning method needs to be implemented in order for the data to be parsed in real-time, and eliminate the need for a scientist-in-the-loop, or SITL.

## Related Works

### Evaluation Criteria

### Methods Evaluated

```
library(dplyr)

## 
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
## 
##     filter, lag

## The following objects are masked from 'package:base':
## 
##     intersect, setdiff, setequal, union

name_mms <- "mss_20151026.csv"
name_mitl <- "mitl_20151026.csv"
data <- read.csv("spaceDataset.csv")
data.frame <- data.frame(data)
data.frame$X1 <- 1:nrow(data.frame)
data.frame2 <- data.frame(data$DES.N, data$FGM.Bt, data$DES.T_para, data$DES.T_perp)
data.frame2 <- na.omit(data.frame2)
lm.fit <- lm(data.frame$DES.N ~ data.frame$FGM.Bt, data = data.frame)
summary(lm.fit)

## 
## Call:
## lm(formula = data.frame$DES.N ~ data.frame$FGM.Bt, data = data.frame)
## 
## Residuals:
##      Min       1Q   Median       3Q      Max 
## -34.028 -10.877  -5.224   7.937 239.837 
## 
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)    
## (Intercept) 35.11349   0.05592  628.0   <2e-16 ***
## data.frame$FGM.Bt -0.45487   0.00149  -305.4   <2e-16 ***
```

```

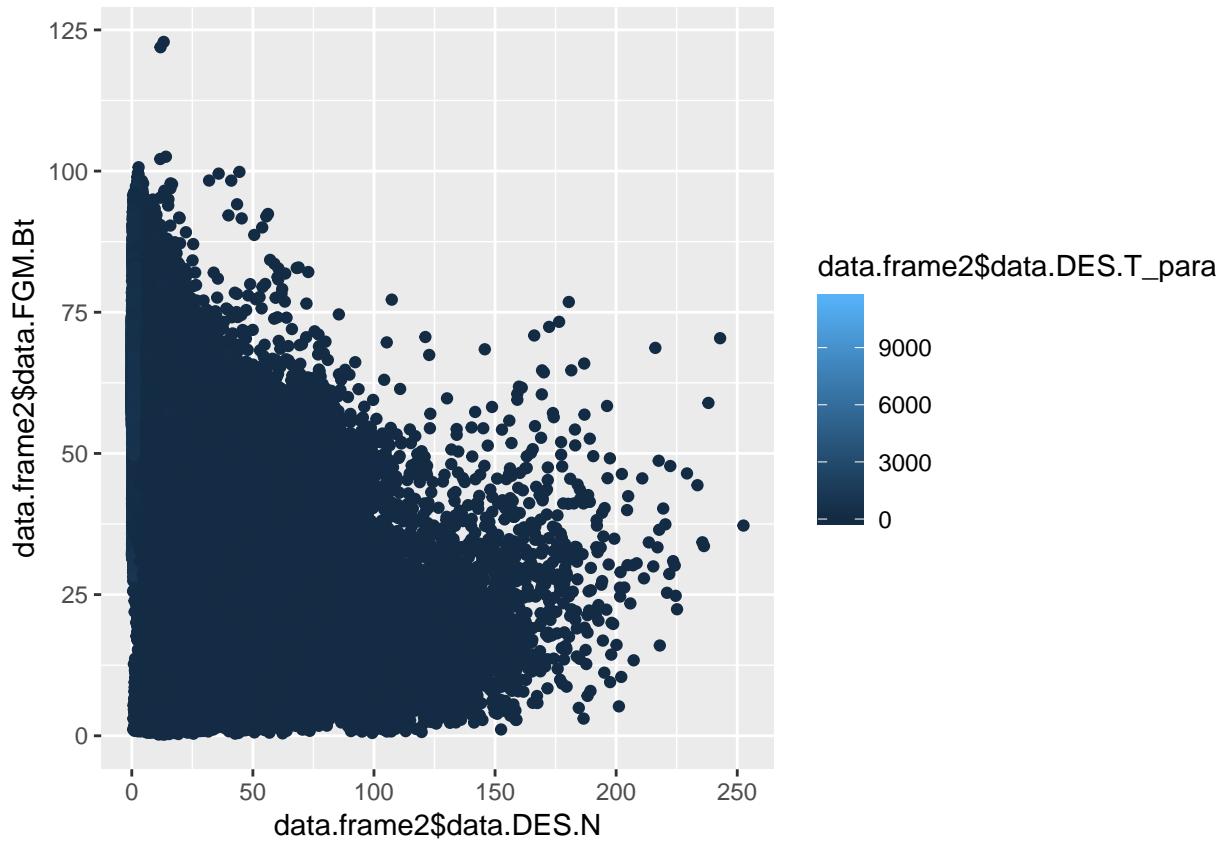
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 17.52 on 395456 degrees of freedom
## Multiple R-squared:  0.1908, Adjusted R-squared:  0.1908
## F-statistic: 9.324e+04 on 1 and 395456 DF,  p-value: < 2.2e-16

```

```

library(ggplot2)
ggplot(data.frame2, mapping = aes(x = data.frame2$data.DES.N, y = data.frame2$data.FGM.Bt, color =

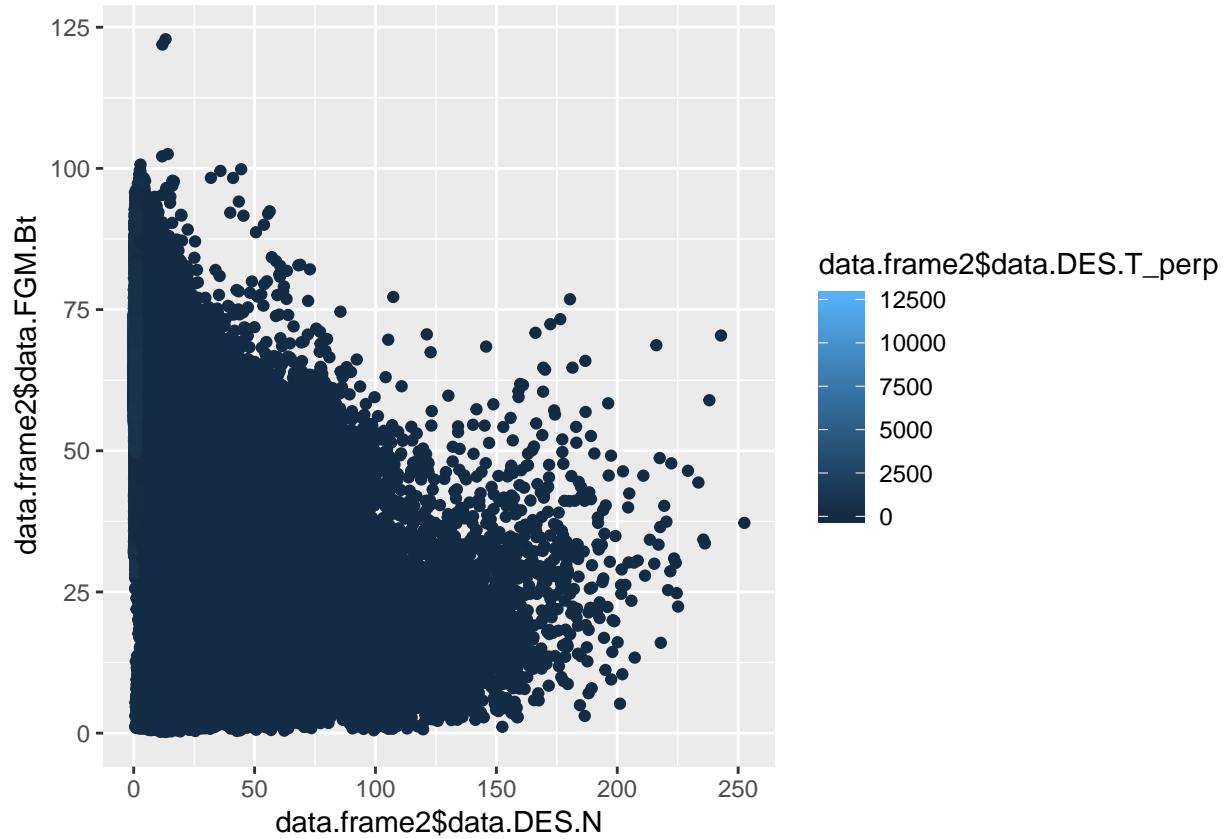
```



```

ggplot(data.frame2, mapping = aes(x = data.frame2$data.DES.N, y = data.frame2$data.FGM.Bt, color =

```



## Recommended Methods

### Analysis of Results

### NOTES

Try using these functions (using DES.N and FGM.Bt): - PCA - K-Means - SVM