# The Effects of Fire Suppression and Prevention Spending on Total Acres Burned

DS 2010 Data Science II: Modelling and Data Analysis

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# Outline

1. Introduction
2. Methodology
3. Result

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- Wildfire is the big problem that need a lot of resources to reduce the casualties.

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- We want to find the way to balance the budget and the loss that will causes from non-sufficient budget.

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- Multiple Linear Regression (MLR)
- Decision Tree

# Result

# Multiple Linear Regression

Let say $A$ is the area (in acres) of wildfire in a year, $b_{sfs}$ is the suppression budget from forest service, $b_{sdoi}$ is the suppression budget from department of interior, and $b_p$ spending for prevention. Then,

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with adjusted-$R^2$ be 0.291.

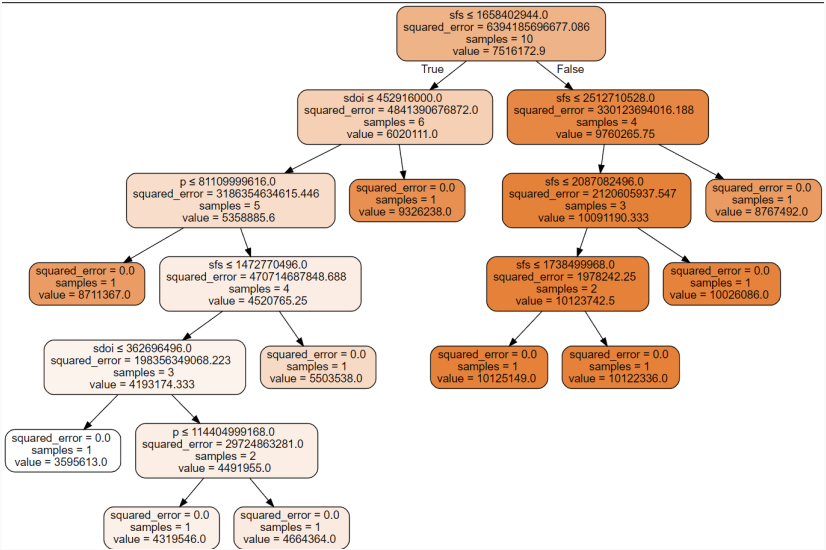
# Multiple Linear Regression with Power Transform

We use Box-Cox transformation on the predictors (divided by 1M) and we found out that the regression equation changed into

$$A = (7.516 \times 10^6) + (2.389 \times 10^6)\frac{b_{sdoi}^{1.2675} - 1}{1.2675} - (1.403 \times 10^6)\frac{b_p^{2.1287} - 1}{2.1288}$$

with adjusted-$R^2$ be 0.344 (constant term be $6.29 \times 10^6$).

# Decision Tree



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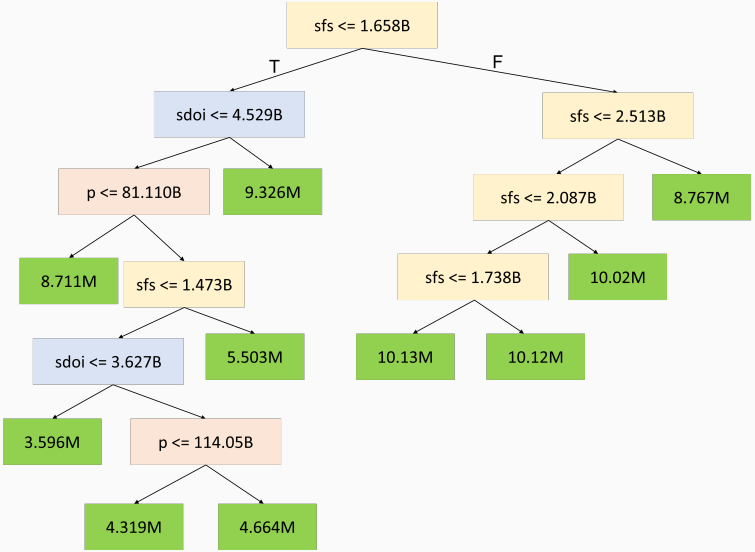

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- Budget on suppression does increase the area of fire (said by MLR) but it is clear that the suppression budget from forest service is significant if it is greater than 1.7B.
- We can't tell for certain how much we need to allocate for fire prevention and suppression as the occurrences of fire depends on other variables (for example, location, weather, etc.) that we don't have.
- Our data size is too small to make our model works well.