

# Homework 1

---

Drake Lambert

## 1. Trellis Plot

- Multimodal
  - Alcohol
  - Total phenols
  - Flavanoids
  - Nonflavanoid phenols
  - OD280/OD315 of diluted wines
- Unimodal
  - Malic acid
  - Ash
  - Alcalinity of ash
  - Magnesium
  - Proanthocyanins
  - Color intensity
  - Hue
  - Proline
- Positive correlation of:
  - Total phenols and Flavanoids
  - Alcohol and Proline
  - Total phenols and Proanthocyanins
  - Flavanoids and Proanthocyanins
  - Flavanoids and OD280/OD315 of diluted wines
- No Negative Correlations
- All others uncorrelated
- Substantially different values based on A
  - Alcohol
  - Malic Acid (Only A=3)
  - Proline
  - OD280/OD315 of diluted wines
  - Hue (Only A=3)
  - Color Intensity
  - Proanthocyanins (Only A=3)
  - Nonflavanoid phenols (Only A=3)
  - Flavanoids
  - Total phenols
  - Alcalinity of ash
- Mathematical criterion:  $(\text{Difference between medians}) / (\text{Overall visible spread})$

## 2. Linear Regression

- The learned value of theta was:

```
theta =  
340403.61774  
106903.96686  
theta_normal =  
71270.49245  
134.52529
```

- Calculate price of house with 1750 sqft:  $71270.49245 + 134.52529 * 1750 \approx 306689.75$
- Learning rates of 0.05, 0.1, and 1 were able to learn correctly. The other values were either not able to learn fast enough or would not converge.