Group 10
Modeling Suicide Rates at the Country Level

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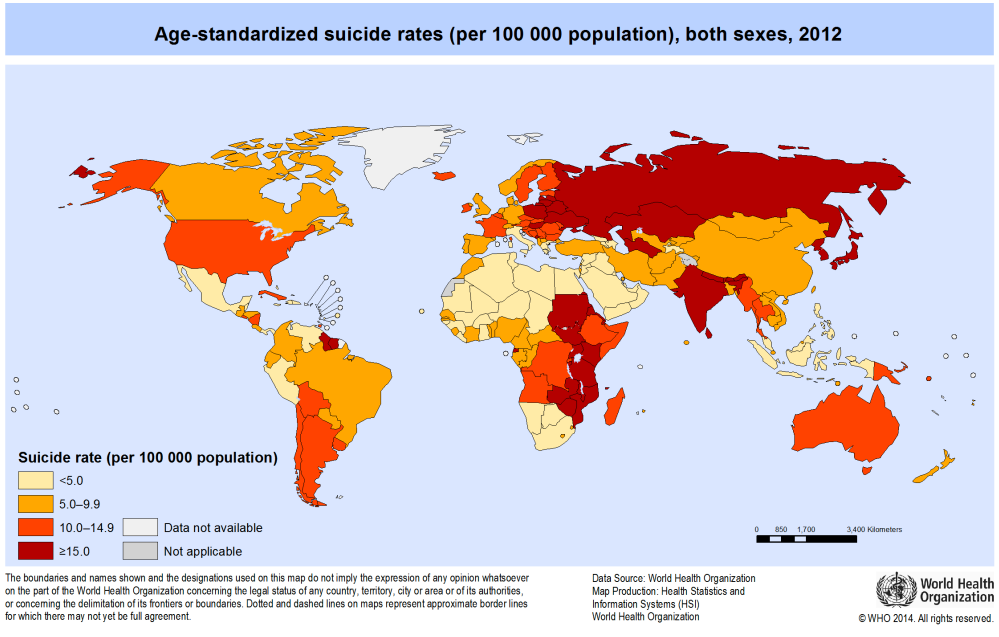


Inputs:

Youth Unemployment, Alcohol Consumption, Life Expectancy, Country Population, Fertility Rate

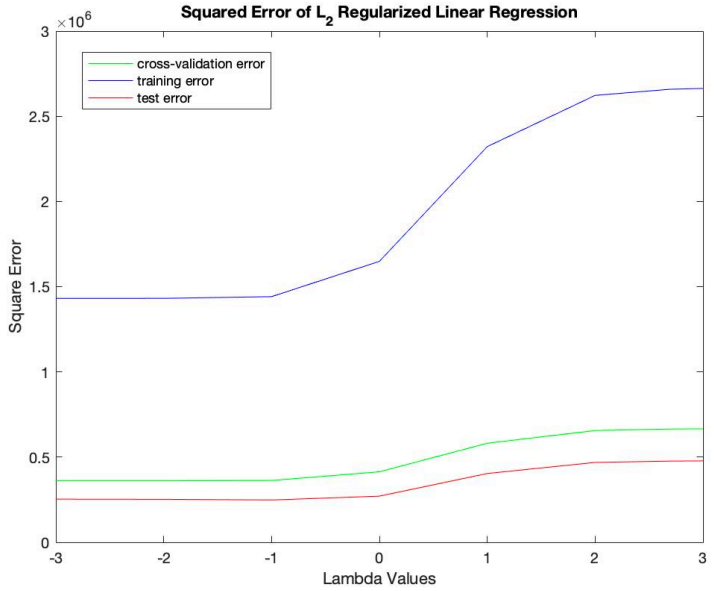
Output:

Number of Suicides per 100k population (in a year)

Model:

Regression Problem - $R^8 \rightarrow R$

- Countries too distinct for Nearest Neighbor



- Observable data is best explanation
- Machine learning is **not a must** given data

Nearest Neighbors

- Euclidean Distance
- Minkowski Distance

$$MD_p(\mathbf{q}, \mathbf{x}_i) = \left(\sum_{f \in F} |\mathbf{q}_f - \mathbf{x}_{if}|^p \right)^{\frac{1}{p}}$$

- k = [1, 2, 5, 10]
- q = [1, 2, 3]

Best Method:
k = 1, q = 2
1-NN with Euclidean

Regression

- Least Squares
  - Unregularized
  - L_2 Regularized
- Logistic
  - Unregularized
  - L_2 Regularized
- $\lambda = [10^{-3}, 10^{-2}, 10^{-1}, 1, 10, 100, 500, 1000]$

Best Method:
$\lambda = 10^{-2}$
Logistic, L_2 Regularization

Neural Network

- ReLU
- Sigmoid
- # Iterations = 20000
- Learning Rate = 0.01
- 1 Hidden Layer
- Hidden Layer Size = [1, 5, 10, 15, 25, 50, 100]

$$Y_{country,t=2013} \approx Y_{country,t=2014}$$

Best Method:
Sigmoid Loss Function
Hidden Layer with 100 Nodes