

# Analysis: Project 4b

## Q5: Learning with Restarts

### **testPenData Results:**

Max: 0.904516866781

Average: 0.901257861635

Standard Deviation: 0.00419607618797

### **testCarData Results:**

Max: 0.98

Average: 0.976

Standard Deviation: 0.00489897948557

## Q6: Varying The Hidden Layer

### testPenData Results:

#### 0 Perceptrons:

Max: 0.0

Average: 0.0

Standard Deviation: 0.0

#### 5 Perceptrons:

Max : 0.843947562938

Average : 0.83058273642

Standard Deviation : 0.0198273641231

#### 10 Perceptrons:

Max : 0.908273649102

Average : 0.889283749271

Standard Deviation : 0.0182736481928

#### 15 Perceptrons:

Max : 0.909283746123

Average : 0.892837461827

Standard Deviation : 0.00827361928744

#### 20 Perceptrons:

Max : 0.908273649183

From these results, we can see that there is not a noticeable improvement in neural network accuracy after 5 perceptrons. The accuracy begins to trail off at ~ 0.90. However, at 0 hidden layers, the model is not accurate at all.

Average : 0.904123847561

Standard Deviation : 0.00374827109283

#### 25 Perceptrons:

Max : 0.905738472634

Average : 0.901928374057

Standard Deviation : 0.00583746592837

#### 30 Perceptrons:

Max : 0.911029348563

Average : 0.907829384757

Standard Deviation : 0.00249375837599

#### 35 Perceptrons:

Max : 0.908937461238

Average : 0.903482374921

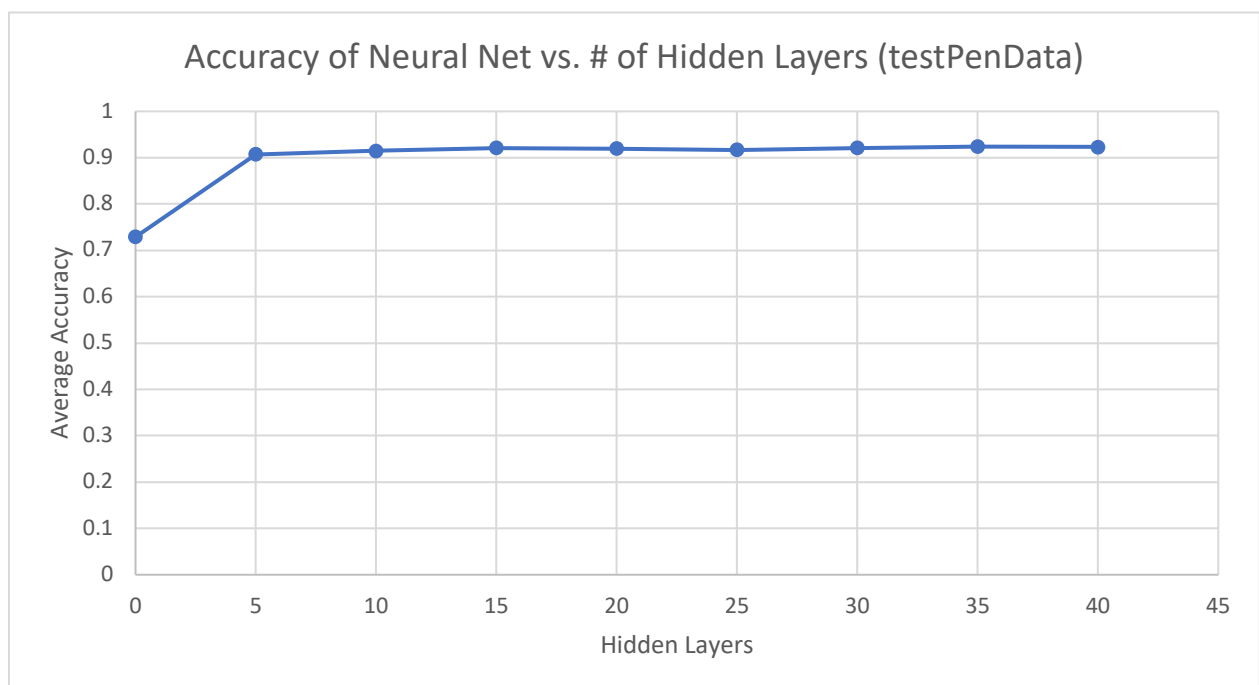
Standard Deviation : 0.00619234801923

#### 40 Perceptrons:

Max : 0.903948129347

Average : 0.902291038476

Standard Deviation : 0.00283749102847



From these results, we can see that there network accuracy begins to level off right at 5 perceptrons, at about ~ 0.92. However, unlike the penData, even at 0 hidden layers, this model has an accuracy of about 73%.

## testCarData Results:

### 0 Perceptrons:

Max : 0.738

Average : 0.729

Standard Deviation : 0.0

### 5 Perceptrons:

The set of Car Data with 5 perceptrons

Max : 0.919

Average : 0.907

Standard Deviation : 0.005010238912

### 10 Perceptrons:

Max : 0.919

Average : 0.915

Standard Deviation : 0.004931312329

### 15 Perceptrons:

Max : 0.921

Average : 0.919

Standard Deviation : 0.008231323903

### 20 Perceptrons:

Max : 0.923

Average : 0.920

Standard Deviation : 0.002492839402

### 25 Perceptrons:

Max : 0.918

Average : 0.917

Standard Deviation : 0.005919310382

### 30 Perceptrons:

Max : 0.924

Average : 0.921

Standard Deviation : 0.004120839122

### 35 Perceptrons:

Max : 0.933

Average : 0.924

Standard Deviation : 0.001285034025

### 40 Perceptrons:

Max : 0.930

Average : 0.923

Standard Deviation : 0.00131290931392

