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| logo.jpg  **Artificial Neural Networks Course**  **Computer Science Department**  **Faculty of Computer and Information Sciences**  **Ain Shams University, Egypt** |
| **A Report of Final Project - MLP**  **By:** |

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| --- | --- |
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| **Project Title** | |
| ***Head Orientation Recognition*** | |

**2nd Semester 2014\2015**

# **Results**

**Model 1**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layers** | | **Output layer** | |
| 10 | # Neurons | 2500 | # Hidden layers | 1 | # Neurons | 3 |
|  |  |  | Hidden layer (1) | |  |  |
|  |  |  | # Neurons | 2 |  |  |
|  |  | |  |  | **Accuracy** | 66.6% |

**Eta: 0.15**

**Bias: 1**

**Model 2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layers** | | **Output layer** | |
| 10 | # Neurons | 2500 | # Hidden layers | 1 | # Neurons | 3 |
|  |  |  | Hidden layer (1) | |  |  |
|  |  |  | # Neurons | 3 |  |  |
|  |  | |  |  | **Accuracy** | 66.6% |

**Eta: 0.15**

**Bias: 1**

**Model 3**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layers** | | **Output layer** | |
| 10 | # Neurons | 2500 | # Hidden layers | 1 | # Neurons | 3 |
|  |  |  | Hidden layer (1) | |  |  |
|  |  |  | # Neurons | 2 |  |  |
|  |  | |  |  | **Accuracy** | 66.6% |

**Eta: 0.25**

**Bias: 1**

**Model 4**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layers** | | **Output layer** | |
| 20 | # Neurons | 2500 | # Hidden layers | 2 | # Neurons | 3 |
|  |  | | Hidden layer (1) | |  | |
|  |  | | # Neurons | 3 |  |  |
|  |  | | Hidden layer (2) | |  |  |
|  |  | | # Neurons | 3 |  |  |
|  |  | |  |  | **Accuracy** | 33.3% |

**Eta: 0.15**

**Bias: 1**

**Model 5**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layers** | | **Output layer** | |
| 50 | # Neurons | 2500 | # Hidden layers | 1 | # Neurons | 3 |
|  |  | | Hidden layer (1) | |  | |
|  |  | | # Neurons | 3 |  |  |
|  |  | |  |  | **Accuracy** | 100% |

**Eta: 0.25**

**Bias: 1**

**Model 6**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layers** | | **Output layer** | |
| 25 | # Neurons | 2500 | # Hidden layers | 2 | # Neurons | 3 |
|  |  | | Hidden layer (1) | |  | |
|  |  | | # Neurons | 3 |  |  |
|  |  | | Hidden layer (2) | |  |  |
|  |  | | # Neurons | 3 |  |  |
|  |  | |  |  | **Accuracy** | 66.6% |

**Eta: 0.25**

**Bias: 1**

**Model 7**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layers** | | **Output layer** | |
| 25 | # Neurons | 2500 | # Hidden layers | 1 | # Neurons | 3 |
|  |  | | Hidden layer (1) | |  | |
|  |  | | # Neurons | 4 |  |  |
|  |  | |  |  | **Accuracy** | 100% |

**Eta: 0.25**

**Bias: 1**

**Model 8**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layers** | | **Output layer** | |
| 25 | # Neurons | 2500 | # Hidden layers | 3 | # Neurons | 3 |
|  |  | | Hidden layer (1) | |  | |
|  |  | | # Neurons | 4 |  |  |
|  |  | | Hidden layer (2) | |  |  |
|  |  | | # Neurons | 4 |  |  |
|  |  | | Hidden layer (3) | |  |  |
|  |  | | # Neurons | 4 |  |  |
|  |  | |  |  | **Accuracy** | 33.3% |

**Eta: 0.25**

**Bias: 1**

**Model [TEMPLATE]**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layers** | | **Output layer** | |
|  | # Neurons |  | # Hidden layers |  | # Neurons |  |
|  |  | | Hidden layer (1) | |  | |
|  |  | | # Neurons |  |  |  |
|  |  | | Hidden layer (2) | |  |  |
|  |  | | # Neurons |  |  |  |
|  |  | | .  .  .  . | |  |  |
|  |  | | Hidden layer (N) | |  |  |
|  |  | | # Neurons |  |  |  |
|  |  | |  |  | **Accuracy** | % |

**Eta: ##**

**Bias: ##**

# **The Best Model**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layers** | | **Output layer** | |
| 50 | # Neurons | 2500 | # Hidden layers | 1 | # Neurons | 3 |
|  |  | | Hidden layer (1) | |  | |
|  |  | | # Neurons | 3 |  |  |
|  |  | |  |  | **Accuracy** | 100% |

**Eta: 0.25**

**Bias: 1**

# **Conclusion**

The best model among these trials proves that the more layers in the model, doesn’t equal more accuracy. The main differences between the best model and other models are:

1. Number of epochs
2. Number of layers
3. Number of neurons in hidden layers

And while increasing number of layers had a bad impact on the accuracy, increasing number of epochs does just the opposite. Increasing number of epochs helped the best model to achieve this accuracy, comparing with other models.

The next-best model (#7) also had a 100% accuracy. The main difference between the best and the next-best model, is that the next-best model had a lower number of epochs than the best model, with more neurons in hidden layers. We chose #5 as the best model due to the number of neurons required in hidden layers in #7 (3 vs. 4).

While trying different models with this data set, models with more than one hidden layer had the worst accuracy among all trials.