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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 - RBFN**  **By** |

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

**2nd Semester 2014\2015**

# **Results**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layer** | | **Output layer** | |
| 1000 | # Neurons | 256 | # Hidden neurons | 6 | # Neurons | 3 |
|  |  | |  |  | **Accuracy** | 98.89% |

|  |  |  |  |  |  |  |
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| **# Epochs** | **Input layer** | | **Hidden layer** | | **Output layer** | |
| 1000 | # Neurons | 256 | # Hidden neurons | 7 | # Neurons | 3 |
|  |  | |  |  | **Accuracy** | 96.67% |

# **Model 3.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layer** | | **Output layer** | |
| 1000 | # Neurons | 256 | # Hidden neurons | 15 | # Neurons | 3 |
|  |  | |  |  | **Accuracy** | 97.78% |

# **Model 4.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layer** | | **Output layer** | |
| 1000 | # Neurons | 256 | # Hidden neurons | 9 | # Neurons | 3 |
|  |  | |  |  | **Accuracy** | 98.89% |

# **Model 5.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layer** | | **Output layer** | |
| 1000 | # Neurons | 256 | # Hidden neurons | 12 | # Neurons | 3 |
|  |  | |  |  | **Accuracy** | 95.56% |

# **The Best Model**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# Epochs** | **Input layer** | | **Hidden layer** | | **Output layer** | |
| 1000 | # Neurons | 256 | # Hidden neurons | 5 | # Neurons | 3 |
|  |  | |  |  | **Accuracy** | 98.89% |

# **Conclusion**

On the 240-image dataset radial basis function produced an accuracy of 98.89% with k means++

and principal component analysis on the dataset to reduce the size from 50x50 to 16x16.

The algorithm is highly dependent on the centers the k-means clustering produces, thus giving varying results depending on the final place of the centroids.

when running on the 12000-image dataset the accuracy reached only 61% on the 6000 test image with 35 hidden neurons with k means++ and PCA with 100 epochs, which is a very poor accuracy compared to the MLP which reached 97.83%.

The MLP reached higher accuracy in both the datasets and is more consistent than the RBF.

The only advantage for the RBF over MLP is the speed of the training process.