Dumb Charades Project

Assignment 3

**Data Mining**

CSE 572 | Spring 2018

Submitted on:

04/12/2018

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# Introduction

This is a project report for Assignment 3 of CSE 572 Data Mining course. The ultimate goal of this project is to develop a procedure to identify human gestures which includes:

1. identifying known gestures
2. segment sequence of gestures
3. identifying unknown gestures.

In this assignment, we have tried to classify the data using Decision Tree, SVM and Neural Networks. We have mainly measured the performance based on the following criteria:

* Accuracy
* Precision
* Recall
* F1 Score

# Data

The four tables below shows the accuracy, precision, recall and F1 score for all the gestures using Decision Trees, SVM and Neural Network.

We have considered 60% of the data as the training set. And the value of N defines how much data we have actually considered while training:

* **N == 1: the complete training data (60% of the overall data) for training**
* **N == 2: half of the training data (30% of the overall data) for training**
* **N == 4: a quarter of the training data (15% of the overall data) for training**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| GESTURE | DECISION TREE | | | SVM | | | NEURAL NETWORK |
| **N=4** | **N=2** | **N=1** | **N=4** | **N=2** | **N=1** | **NEURONS = 400** |
| ABOUT | 92.283 | 94.0039 | 97.0936 | 66.881 | 80.0774 | 88.9128 | 87.4275 |
| AND | 94.4984 | 93.0097 | 96.5517 | 67.3139 | 80.3883 | 89.1164 | 82.5243 |
| CAN | 97.7273 | 98.2524 | 98.6006 | 73.7013 | 82.7184 | 89.0205 | 94.7573 |
| COP | 93.2692 | 95.3578 | 96.875 | 66.6667 | 79.8839 | 88.7931 | 87.0406 |
| DEAF | 97.0588 | 97.271 | 97.6293 | 82.6797 | 89.0838 | 89.6552 | 91.2281 |
| DECIDE | 94.5763 | 97.8261 | 98.2777 | 72.2034 | 83.7945 | 91.1733 | 90.9091 |
| FATHER | 98.9933 | 99.4094 | 99.3534 | 92.2819 | 94.4882 | 97.0905 | 97.2441 |
| FIND | 93.1373 | 95.3216 | 96.1249 | 68.6275 | 81.2865 | 89.6663 | 84.6004 |
| GO OUT | 96.31 | 97.3469 | 98.0603 | 81.5498 | 89.7959 | 94.6121 | 92.0408 |
| HEARING | 98.1073 | 99.2322 | 99.7845 | 90.5363 | 78.6948 | 88.0388 | 95.7774 |

**Fig 1: Accuracy**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| GESTURE | DECISION TREE | | | SVM | | | NEURAL NETWORK |
| **N=4** | **N=2** | **N=1** | **N=4** | **N=2** | **N=1** | **NEURONS = 400** |
| ABOUT | 67.5958 | 83.1276 | 89.8004 | 100 | 100 | 100 | 83.1858 |
| AND | 67.4658 | 82.2547 | 90.9598 | 100 | 100 | 100 | 86.3529 |
| CAN | 68.4385 | 81.0277 | 90.5022 | 69.163 | 95.0704 | 99.5163 | 82.377 |
| COP | 68.7285 | 81.1359 | 89.6552 | 100 | 100 | 100 | 88.8889 |
| DEAF | 70.0337 | 82.1643 | 91.17 | 79.8419 | 91.2473 | 100 | 88.2479 |
| DECIDE | 72.4014 | 85.0505 | 91.6758 | 100 | 100 | 100 | 88.4783 |
| FATHER | 71.8644 | 83.3663 | 91.1063 | 75.6364 | 86.875 | 93.3407 | 84.8178 |
| FIND | 69.8246 | 83.0266 | 90.9295 | 100 | 100 | 100 | 93.0876 |
| GO OUT | 83.5249 | 90.566 | 95.7143 | 100 | 100 | 100 | 97.3392 |
| HEARING | 65.9164 | 79.1103 | 88.2289 | 70.7317 | 100 | 100 | 81.5631 |

**Fig 2: Precision**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| GESTURE | DECISION TREE | | | SVM | | | NEURAL NETWORK |
| **N=4** | **N=2** | **N=1** | **N=4** | **N=2** | **N=1** | **NEURONS = 400** |
| ABOUT | 93.2692 | 97.5845 | 98.063 | 100 | 100 | 100 | 93.3002 |
| AND | 94.7115 | 95.1691 | 98.549 | 100 | 100 | 100 | 89.5122 |
| CAN | 99.0385 | 98.7952 | 100 | 75.4808 | 97.5904 | 99.2762 | 96.6346 |
| COP | 96.1538 | 96.8523 | 97.8155 | 100 | 100 | 100 | 88.1057 |
| DEAF | 99.0476 | 98.3213 | 99.2788 | 96.1905 | 100 | 100 | 90.9692 |
| DECIDE | 94.8357 | 99.2925 | 98.8194 | 100 | 100 | 100 | 93.3486 |
| FATHER | 100 | 99.763 | 99.7625 | 98.1132 | 98.8152 | 99.8812 | 97.4419 |
| FIND | 94.7619 | 97.3621 | 97.479 | 100 | 100 | 100 | 85.9574 |
| GO OUT | 98.6425 | 98.1818 | 98.063 | 100 | 100 | 100 | 92.0335 |
| HEARING | 99.5146 | 99.7561 | 100 | 98.5437 | 100 | 100 | 95.5399 |

**Fig 3: Recall**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| GESTURE | DECISION TREE | | | SVM | | | NEURAL NETWORK |
| **N=4** | **N=2** | **N=1** | **N=4** | **N=2** | **N=1** | **NEURONS = 400** |
| ABOUT | 94.1748 | 96.3051 | 98.3607 | 80.1541 | 88.9366 | 94.1311 | 92.0441 |
| AND | 95.8637 | 95.6311 | 98.0746 | 80.4642 | 89.1281 | 94.245 | 89.0777 |
| CAN | 98.3294 | 98.9144 | 99.222 | 79.4937 | 90.1001 | 94.1648 | 96.7509 |
| COP | 95.0119 | 97.0874 | 98.2328 | 80 | 88.8172 | 94.0639 | 92.2722 |
| DEAF | 97.8824 | 98.3213 | 98.6858 | 88.4026 | 93.7079 | 94.5455 | 94.8335 |
| DECIDE | 96.1905 | 98.7104 | 99.0533 | 83.8538 | 91.1828 | 95.3829 | 94.6512 |
| FATHER | 99.2974 | 99.645 | 99.6441 | 94.7608 | 96.7517 | 98.4201 | 98.3568 |
| FIND | 94.9881 | 97.1292 | 97.8313 | 81.3953 | 89.6774 | 94.5516 | 91.0936 |
| GO OUT | 97.7578 | 98.5177 | 98.9773 | 89.8374 | 94.6237 | 97.2315 | 95.747 |
| HEARING | 98.5577 | 99.5134 | 99.8778 | 93.1193 | 88.0773 | 93.639 | 97.3684 |

**Fig 4: F1 Score**

# Conclusion

In the cases of Decision Tree and SVM, we can see that all the measures (accuracy, precision, recall and F1 score) increases if we take 60% of the data as training data. If we take less data, in most cases, the performance decreses.