## Tables:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Reference:** | **Problems:** | **Objectives:** | **Bad posture:** | **Strain:** | **Cost Effective:** | **Classification:** |
| [28] | Bad posture. | Bad posture alert. | Yes | No | Not explicitly mentioned. | No |
| [37] | Pain in body parts. | Identification of postures. | Yes | No | No | SVM, DT and RF. |
| [48] | Health problems due to digital devices. | Posture detection. | Yes | No | Yes | No |
| [54] | High cost of medical treatment. | Posture detection. | Yes | No | Yes. | ANN based Classifiers. |
| [61] | Low back pain. | Bad posture alert. | Yes | No | Not explicitly mentioned. | No |
| [62] | Muscle tissue contractions. | Detect tissues injury. | Yes | No | No | No |
| Proposed MSDS. | Strain due to bad posture. | To, identify health issues due to bad posture & strain detection. | Yes | Yes | Yes | Yes |

**Table 1.** Comparison with previous studies.

|  |  |  |
| --- | --- | --- |
| **Posture** | **Strain** | **Muscle Status (Strain Value)** |
| 40 | 41 | 0 |
| 41 | 30 | 0 |
| 42 | 47 | 0 |
| 43 | 41 | 0 |
| 44 | 42 | 0 |
| 47 | 33 | 0 |
| 49 | 37 | 0 |
| 51 | 33 | 0 |
| 50 | 63 | 1 |
| 48 | 31 | 0 |
| 14 | 77 | -1 |
| 39 | 36 | 0 |
| 15 | 78 | -1 |
| 32 | 39 | 0 |
| 35 | 38 | 0 |
| 16 | 35 | 0 |

Table 2. Sensor’s dataset was collected using PLX-DAQ in an Excel file.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Classes** | **Precision** | **Recall** | **F1-Score** | **Support** |
| -1 | 0.94 | 0.87 | 0.91 | 39 |
| 0 | 0.96 | 0.95 | 0.95 | 205 |
| 1 | 0.82 | 0.88 | 0.84 | 56 |
| Accuracy |  |  | 0.93 | 300 |
| Macro Average | 0.91 | 0.90 | 0.90 | 300 |
| Weighted Average | 0.93 | 0.93 | 0.93 | 300 |

Table 3. Classification Report of Naive Bayes classifier.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Classes** | **Precision** | **Recall** | **F1-Score** | **Support** |
| -1 | 0.94 | 0.87 | 0.91 | 39 |
| 0 | 0.96 | 0.95 | 0.96 | 205 |
| 1 | 0.82 | 0.89 | 0.85 | 56 |
| Accuracy |  |  | 0.93 | 300 |
| Macro Average | 0.91 | 0.91 | 0.91 | 300 |
| Weighted  Average | 0.93 | 0.93 | 0.93 | 300 |

Table 4. Classification Report of SVM classifier.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Classes** | **Precision** | **Recall** | **F1-Score** | **Support** |
| -1 | 1.00 | 1.00 | 1.00 | 39 |
| 0 | 97.0 | 97.0 | 97.0 | 205 |
| 1 | 90.0 | 91.0 | 92.0 | 56 |
| Accuracy |  |  | 0.99 | 300 |
| Macro Average | 0.96 | 0.96 | 0.96 | 300 |
| Weighted Average | 0.96 | 0.96 | 0.96 | 300 |

Table 5. Classification Report of KNN classifier.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Classes** | **Precision** | **Recall** | **F1-Score** | **Support** |
| -1 | 0.97 | 1.00 | 0.99 | 39 |
| 0 | 0.99 | 1.00 | 0.99 | 205 |
| 1 | 0.98 | 0.95 | 0.96 | 56 |
| Accuracy |  |  | 0.99 | 300 |
| Macro Average | 0.98 | 0.98 | 0.98 | 300 |
| Weighted Average | 0.99 | 0.99 | 0.99 | 300 |

Table 6. Classification Report of Decision Tree classifier.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Classes** | **Precision** | **Recall** | **F1-Score** | **Support** |
| -1 | 0.97 | 1.00 | 0.99 | 39 |
| 0 | 1.00 | 1.00 | 1.00 | 205 |
| 1 | 0.98 | 0.96 | 0.97 | 56 |
| Accuracy |  |  | 0.99 | 300 |
| Macro Average | 0.98 | 0.99 | 0.99 | 300 |
| Weighted Average | 0.99 | 0.99 | 0.99 | 300 |

Table 7. Classification of Random Forest classifier.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Algorithm | Classes | Precision | Recall | F1-Score | Support | Accuracy |
| Naive Bayes | -1 | 0.94 | 0.87 | 0.91 | 39 | 92.67% |
| 0 | 0.96 | 0.95 | 0.95 | 205 |
| 1 | 0.85 | 0.84 | 0.84 | 56 |
| SVM | -1 | 0.94 | 0.87 | 0.91 | 39 | 93.67% |
| 0 | 0.96 | 0.95 | 0.95 | 205 |
| 1 | 0.82 | 0.84 | 0.84 | 39 |
| KNN | -1 | 1.00 | 1.00 | 1.00 | 39 | 96.33% |
| 0 | 97.0 | 97.0 | 97.0 | 205 |
| 1 | 90.0 | 91.0 | 92.0 | 56 |
| Decision Tree | -1 | 0.97 | 1.00 | 0.99 | 39 | 98.67% |
| 0 | 0.99 | 1.00 | 1.99 | 205 |
| 1 | 0.98 | 0.95 | 0.96 | 56 |
| Random Forest | -1 | 0.97 | 1.00 | 0.99 | 39 | 99% |
| 0 | 1.00 | 1.00 | 1.00 | 205 |
| 1 | 0.98 | 0.96 | 0.97 | 56 |

**Table 8.** Comparison of Precision, Recall, F1-Score and Support.