A Comparative Study of Machine Learning Techniques for Emotion Recognition using Peripheral Physiological Signals

Sowmya Vijayakumar, Dr Ronan Flynn, Dr Niall Murray, Dept of Computer and Software Engineering, AIT

Introduction

• Emotions in human produce physical and physiological changes.
• Recent developments in wearable technology have led to increased research interest in using peripheral physiological signals for emotion recognition.

Why peripheral physiological signals?

• Peripheral signals are non-invasive
• Easily measured through wearables
• Long-term monitoring
• Real-time prediction applications

Methodology

• DEAP dataset
• Comparison of eight classification models.
• Feature extraction
• Apply ML models on three different data combinations
  1. Raw data
  2. Feature fusion data
  3. Individual feature data
• Subject-dependent classification

Research Question

1. Can we classify emotions using peripheral physiological signals?
2. Which classification model gives the optimal results in classifying emotions?

Results

<table>
<thead>
<tr>
<th>Classifiers</th>
<th>Optimal</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVM</td>
<td>DT</td>
<td></td>
</tr>
<tr>
<td>LDA</td>
<td>GNB</td>
<td></td>
</tr>
<tr>
<td>Logistic Regression</td>
<td>KNN</td>
<td></td>
</tr>
</tbody>
</table>

Future Work

Create novel implicit metric QoE database

Sliding Window

Deep Learning

Feature extraction - Classification

Hyper Parameter Tuning

Federated Learning