Stress Detection And Prediction System using ANN

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Contents

INTRODUCTION

What is Stress?

- Stress is a natural response of the body to perceived threats or challenges, often referred to as a "fight or flight" response.
- It can be triggered by various factors, including work pressure, personal relationships, financial issues, and health concerns.

Impact of Stress

Chronic stress can lead to anxiety and depression, increase heart rate and blood pressure, suppress the immune system, cause digestive issues, and disrupt sleep patterns.

Importance of Stress Detection

Early detection of stress allows individuals to take proactive measures to manage it, reducing the risk of chronic health issues through strategies like counseling, lifestyle changes, and stress management techniques.

Objective of the Project

The primary aim of this project is to develop an effective system for stress detection and management that enhances individual well-being and promotes proactive health measures.

- **Goals:** Achieve high accuracy in stress identification through data analysis and machine learning, with real-time monitoring for immediate detection, all within a user-friendly interface for easy tracking and resource access.

- **Outcome:** A web application accessible from wearable data inputs, aiming to enhance self-awareness, timely intervention, and overall well-being.

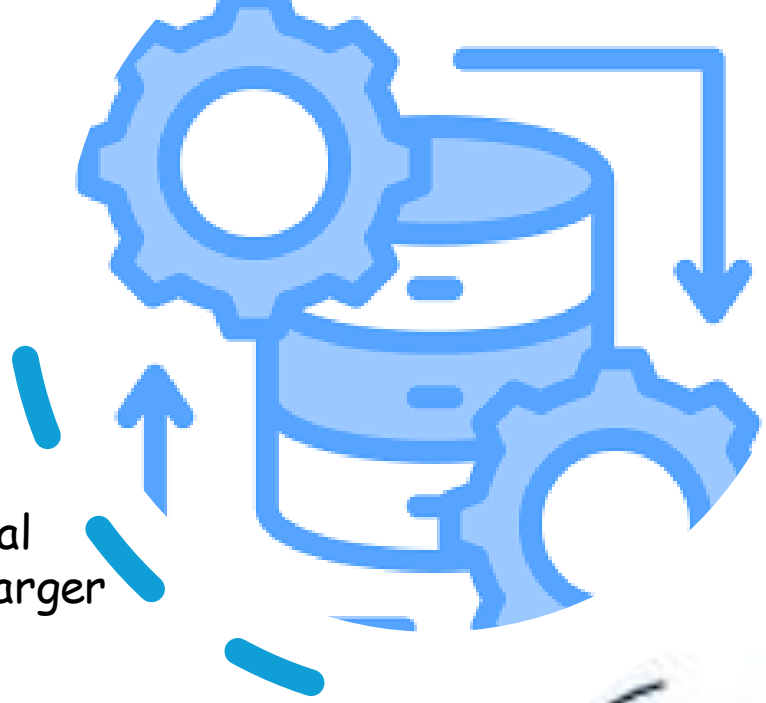
Methodology

Data Collection

- Physiological data, which includes heart rate, body movements, respiratory rate, EEG data, sleep patterns, blood oxygen levels, snoring rate, and limb movement rate.

- Ensure diverse, high-quality data that represents both stressed and non-stressed instances to improve the model's generalizability.

Methodology



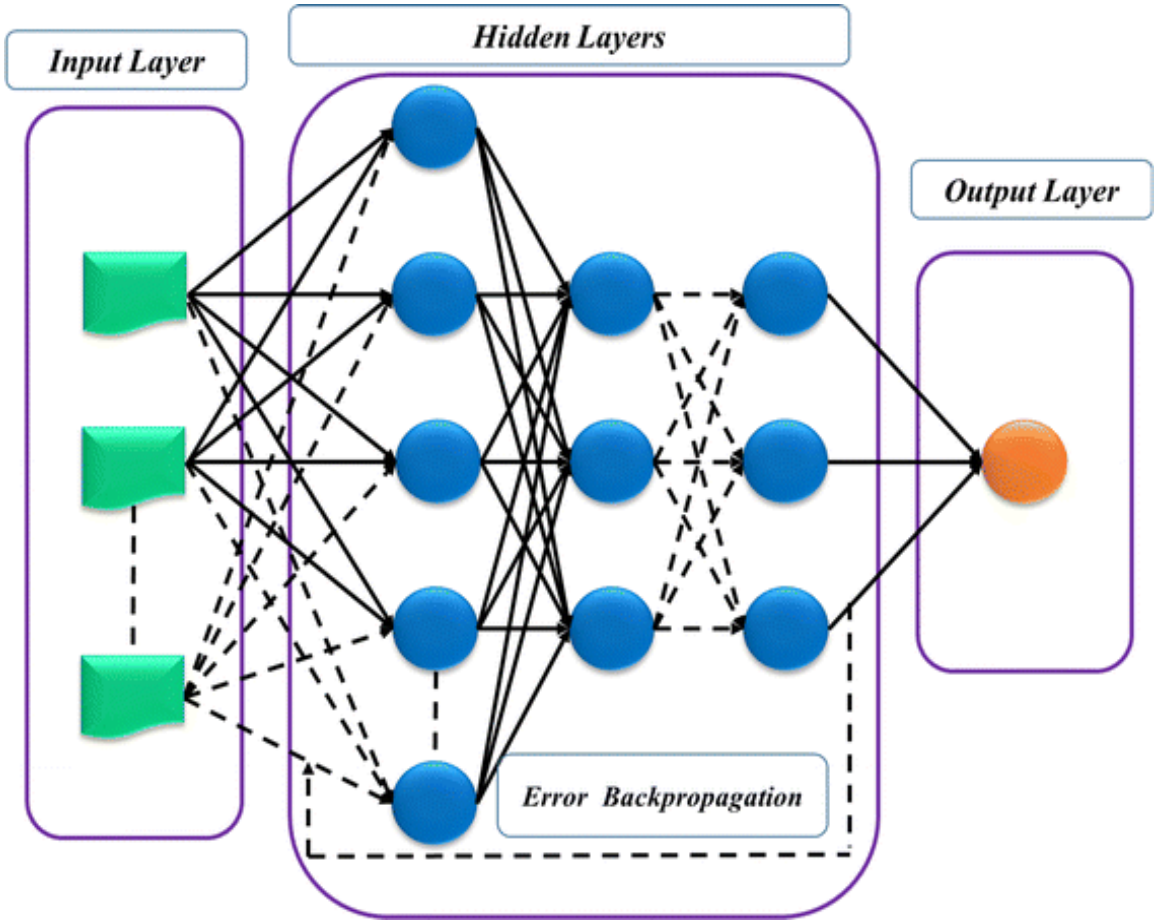
Data Preprocessing

- **Data Normalization:**
Scale data to a uniform range (0 to 1) to ensure equal contribution of features and prevent bias towards larger values.

- **Handling Missing Values:**
Address missing data through imputation (mean, median, mode) or by removing incomplete records to maintain dataset integrity.

- **Feature Selection:**
Select relevant features impacting stress detection using correlation analysis or recursive feature elimination to reduce dimensionality and enhance model performance.

Methodology



ANN Architecture

- **Input Layer:** Accepts multiple features related to physiological parameters.
- **Hidden Layers**: Configured with neurons and layers to capture underlying patterns without overfitting.
- **Output Layer**: A single neuron with sigmoid activation for binary classification.

Implementation

•**Django Framework Setup**: Django was selected for its simplicity and scalability. The project structure includes an app for stress detection and organized templates for frontend design.

•**Backend and Model Deployment**: The ANN model, saved in .h5 format, is loaded into Django using TensorFlow/Keras. User inputs are processed, and the model predicts stress levels in real-time.

•**Frontend Development**: A user-friendly interface lets users enter physiological data (heart rate, sleep hours, etc.). CSS and JavaScript enhance form validation and results display.

•**Key Features**: The Django site offers real-time predictions, an intuitive interface, and scalability for future enhancements like tracking and user registration.

Results

- The ANN model achieved a decent accuracy in predicting stress levels which can be improved with further training, validating its reliability for real-time applications. It identified stress patterns across varied test cases, demonstrating stable performance and prediction consistency.

- The Django web application further enhances accessibility by providing a user-friendly platform where users can input data and instantly receive stress predictions, making the solution both practical and easy to use.

Conclusion

This project successfully integrates machine learning with a web-based interface, allowing users to gain insights into their stress levels through easily accessible technology. The project highlights the power of predictive modeling in health monitoring, and with further improvements, this system could help individuals manage and understand stress in daily life.