TITLE

- Detecting Stress for Healthier Lives
- A Wearable-based AI Solution for Mental Well-being
- Aligning with UN SDG 3 - Good Health and Well-being
- Presenter: Brian Michael
- Course: AI & Machine Learning – Week 2 Assignment

The Problem – Why It Matters

- Stress is a global mental health crisis.
- Prolonged stress contributes to anxiety, burnout, and physical illness.
- Stress is underdiagnosed due to lack of real-time, accessible monitoring tools.

THE AI POWERED SOLUTION

- AI-driven model analyzes physiological signals like and Temperature.
- Uses Random Forest classifier for accurate, real-time stress classification.
- Empowers users with early warnings for stress and supports preventive care.

Project Objective

- **Goal: Build a machine learning model that detects stress using wearable data.**
- **Impact: Promote preventive mental health care in support of SDG 3.**

The Dataset

WESAD Dataset (University of Augsburg)

- **15 participants**
- **Devices: Empatica E4 wristband + RespiBAN chest sensor**
- **Signals: EDA, Temperature, Respiration, ECG, EMG, Accelerometer**
- **Labels: Baseline (0), Stress (1), Amusement (2)**

Approach

Binary Classification Problem
- **1 = Stress**
- **0 = Not Stress (Baseline + Amusement)**

Model Used: Random Forest Classifier

Libraries: pandas, numpy, scikit-learn, matplotlib, seaborn

Workflow

1. **Data Preprocessing**
   - **Selected EDA and Temperature**
   - **Normalized data**
2. **Model Training**
   - **80/20 train-test split**
   - **Random Forest fitted**
3. **Evaluation**
   - **Accuracy: ~99.9%**
   - **Confusion Matrix, Feature Importance**

Visual Insights

- **Confusion Matrix: High precision and recall**
- **Top Features: EDA and Skin Temperature**
- **PCA Visualization: Distinct clusters for stress vs non-stress**

Ethical Considerations

- Bias: Dataset may not generalize across populations
- Privacy: Dataset anonymized; future tools must comply with GDPR/HIPAA
- Access: Must be paired with low-cost wearables for inclusivity

Real-World Impact

Use Cases:
- Stress monitoring in high-risk jobs (nurses, pilots)
- Wellness tracking for individuals
- Early alerts to prevent burnout

Future Work:
- Deploy on mobile devices with wearables
- Explore LSTM or deep learning models
- Integrate with health & wellness platforms

Conclusion

- AI + Wearables = Sustainable Mental Health Support
- Real-time stress detection can empower people and prevent long-term harm.
- This project is a step toward a healthier, more proactive world aligned with SDG 3

Thank You

Contact: Brian Michael
GitHub: https://github.com/Mike-BM/AI-driven-Stress-Detection.git
Dataset: [WESAD - UCI Machine Learning Repository]