INFOTHON 2023

Infothon 2023, the ultimate offline hackathon hosted by the Information Science and Engineering Department of VVCE Mysore! Infothon 2023 is an exhilarating 12-hour coding extravaganza that brings together passionate innovators, programmers, and problem solvers from all walks of life. Held at the prestigious VVCE campus in Mysore, this hackathon is designed to ignite creativity, foster collaboration, and push the boundaries of technological innovation

Sponsored by : Kyte, Learnyst , Taskade and Quine.sh

INFOTHON 2023 was held on July 1st 2023 ,Saturday

Event Schedule

Inaugural function	9:00 - 9:45 am
Rules and Regulation	9:46 - 9:59 am
Start of the event	10:00 am
1st checkpoint	2:00 - 3:00 pm
2nd checkpoint	7:00 - 8:00 pm
Prize Distrubution and Valedictory	8:00 - 9:00 pm

Domain Choice:

The Infothon 12-Hour Hackathon, organized by the ISE Department at Vidyavardhaka Engineering College, Mysuru, provided participants with three exciting domains to choose from: Artificial Intelligence and Machine Learning (AIML), Blockchain, and Web Development. Hence our team decided to explore the AIML domain.

Topic : Emotion Recognition using Heart Rate Pulse Sensor with Arduino for Parkinson's Disease Treatment

Team members:

-Shalini B H 4AL21AI063

-Prkaruthi K P - 4AL21EC063

-Abhishek E - 4AL21CG002

-Pooja H - 4AL21AI030

Abstract:

This solution proposes the use of a heart rate pulse sensor integrated with an Arduino board for emotion recognition to aid in the treatment of Parkinson's disease. By capturing and analyzing heart rate data, the system aims to identify emotional states in patients, providing valuable insights for personalized care and optimizing treatment strategies. This solution combines wearable technology, signal processing techniques, and machine learning algorithms to achieve accurate emotion recognition and real-time feedback.

Introduction:

Parkinson's disease is a neurodegenerative disorder that affects motor functions and emotional well-being. Emotion recognition plays a crucial role in assessing the emotional states of Parkinson's patients, enabling timely interventions and tailored treatment approaches. This solution proposes a wearable system that utilizes an Arduino board and a heart rate pulse sensor to detect and analyze emotional fluctuations.

Hardware Setup:

a. Arduino Board: An Arduino microcontroller board is utilized as the central processing unit to interface with the heart rate pulse sensor and perform real-time signal processing and analysis.

b. Heart Rate Pulse Sensor: A heart rate pulse sensor, such as a photoplethysmography (PPG) sensor, is integrated into the wearable device to capture the patient's heart rate data.

c. Power Supply: The Arduino board and the heart rate pulse sensor are powered using a suitable power source, such as a battery or USB connection.

Signal Acquisition and Processing:

a. Heart Rate Data Acquisition: The heart rate pulse sensor measures the patient's pulse rate by detecting variations in blood volume using optical or electrical techniques. The Arduino board collects the raw heart rate data from the sensor.

b. Signal Filtering: The raw heart rate data is preprocessed to remove noise and artifacts, ensuring accurate and reliable signal quality for subsequent analysis.

Feature Extraction:

a. Heart Rate Variability (HRV): HRV, a measure of the variation in time intervals between consecutive heartbeats, is extracted from the preprocessed heart rate data. HRV is known to be associated with emotional states and can serve as a valuable feature for emotion recognition.

Machine Learning Models:

a. Training Data Collection: Labeled datasets of heart rate data corresponding to different emotional states are collected. These datasets are used to train supervised machine learning models.

b. Feature Selection: Relevant features, such as HRV, are selected from the preprocessed heart rate data for training the machine learning models.

c. Model Training: Supervised machine learning algorithms, such as support vector machines (SVM) or artificial neural networks (ANN), are trained using the labeled datasets and the selected features. The models learn to classify emotional states based on the extracted features.

Emotion Recognition System:

a. Real-time Analysis: The preprocessed heart rate data is fed into the trained machine learning models, which predict the patient's current emotional state in real-time.

b. Emotional State Visualization: The recognized emotional states are visualized using a user-friendly interface, providing real-time feedback to patients and healthcare professionals.

Personalized Treatment and Care:

a. Treatment Adaptation: The emotion recognition system assists healthcare professionals in understanding the emotional well-being of Parkinson's patients. This knowledge can aid in

tailoring treatment plans, medication adjustments, or therapy sessions to address specific emotional needs.

b. Long-term Monitoring: The wearable device with the Arduino-based emotion recognition system enables

Results:

At the conclusion of the hackathon, the team augmented India were recognized for their outstanding efforts**. They secured the 1rd place in the AIML domain**, a testament to their hard work, innovation, and problem-solving skills

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Domain Choice:

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Team Members:

- Kishan Karyappa K - 4AL21AI018

- Dilip Kumar K - 4AL21AI012

- Lohith S. Gowda - 4AL21AI019

- **Saneesha -4AL21AI038**

Team Roles and Contributions:

- Kishan Karyappa K: Kishan spearheaded the integration of speech emotion recognition into our solution. He played a pivotal role in developing the speech analysis module, ensuring accurate detection of vocal cues related to emotions.

- Dilip Kumar K: Dilip was responsible for the facial emotion recognition aspect of our solution. He expertly implemented computer vision techniques, enabling real-time assessment of facial expressions.

- Lohith S. Gowda: Lohith's expertise in machine learning and feature extraction was crucial. He played a vital role in extracting relevant features from speech and facial data and integrating them into our ensemble model.

- Saneesha: Saneesha contributed significantly to the project by overseeing the overall system architecture and data fusion process. She played a key role in ensuring that speech and facial data were synchronized and processed effectively.

Abstract:

Augmented India presents an innovative solution designed to imbue electronic devices with emotional intelligence, enabling them to interact with users based on their emotions. Our approach utilizes speech and facial expression analysis to detect and interpret user emotions, fostering more intuitive and responsive interactions with devices and platforms.

Introduction:

Our solution revolutionizes the way users engage with electronic devices by infusing them with emotional awareness. By harnessing speech and facial expression analysis, we enable devices to understand and respond to users' emotional states, creating a more empathetic and user-friendly experience.

Hardware and Software Setup:

1. Speech Emotion Recognition:We integrated a speech analysis module that captures vocal cues, such as pitch, tone, and speech patterns, using Python's SpeechRecognition library.

2. Facial Emotion Recognition: Augmented India's system utilizes computer vision techniques to assess facial expressions in real-time. We employ OpenCV and a pre-trained deep learning model for this purpose.

Data Fusion and Processing:

We merge data from the two modalities—speech and facial expressions—in real-time to obtain a comprehensive emotional profile. Our system processes and synchronizes these inputs using machine learning algorithms.

Machine Learning Models:

1. Training Data Collection:Augmented India created a diverse dataset with labeled emotional states, encompassing speech and facial expressions.

2. Feature Extraction: We extract relevant features from each modality, such as vocal pitch, tone, and facial landmarks.

3. Ensemble Model:Augmented India employs an ensemble of machine learning models, including Support Vector Machines (SVM), Convolutional Neural Networks (CNNs), and Long Short-Term Memory networks (LSTMs), to fuse the features and predict emotional states effectively.

Emotion Recognition System:

1. Real-time Analysis:Our system continuously analyzes data from speech and facial expressions, offering real-time emotion recognition with high accuracy.

2. Enhancing User Interactions: Augmented India's solution empowers electronic devices and platforms to interact with users based on their emotional states. Devices can offer comforting responses, adjust settings, or provide content tailored to the user's emotions, creating a more emotionally intelligent user experience.

Results:

At the conclusion of the hackathon, the team augmented India were recognized for their outstanding efforts. They secured the 3rd place in the AIML domain, a testament to their hard work, innovation, and problem-solving skills

Conclusion:

Augmented India's pioneering approach to emotion recognition brings emotional intelligence to electronic devices and platforms. By enabling devices to understand and respond to user emotions, we create a more interactive and user-friendly environment. This innovative solution has the potential to transform the way we interact with technology, making it more intuitive and empathetic. We are proud to have presented this solution at INFOTHON 2023, and we look forward to its positive impact on the world of electronic devices and user interfaces.

SYMBIOT

Symbiot is a 24-hour build challenge organized by the Department of ECE, Vidyavardhaka College of Engineering, in association with IoTCrew and IEEE. It is a national-level hackathon where participants from different colleges across the country compete to solve real-world problems. The competition produces top-quality projects which are reviewed by judges from well-known start-ups. The maiden event was conducted in 2019 and witnessed over 100 participants. Symbiot 2020 and 2022 witnessed great success with a registration of 240 participants from various parts of the country .

This event was organised on May 5th and 6th of 2023 with More than 65 groups participate in the event and this Hackathon was for 24 hours with 3 rounds each had points and we toped in all three rounds

Benefits:

1.Learn the importance of teamwork.

2.Appreciate diversity and different cultures.

3.Learn to be an effective communicator.

4.Build capability to discuss innovative ideas.

5. Experience the possibilities of robotics in our lives.

6. Learn how the Internet of Things can change our environment.

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Tracks

- Open Innovation

-Autonomous Tech

-Edge Computing

- Drone Technology

- Machine Learning

-Artificial Intelligence

-Internet of Things

-Robotics

-Agri Tech

-Embedded Systems

- Biomedics

Top notch awards

Winner Prize worth 2.5Lakh+ (Includes 25k cash, Electronics Kit, and Subscriptions) with a rolling Trophy.

-Runner Prize worth 1.5Lakh+ (Includes 15k cash and Subscriptions).

-Second Runner Prize worth 1.25Lakh+ (Includes 10k cash and Subscriptions).

- A Team with the Best Innovative idea will get a reward worth 1Lakh+ (Includes 5k cash and Subscriptions).

-A Special reward for an Innovative idea presented by the Girls group worth 1Lakh+ (Including 5k cash and Subscriptions) 1Lakh+ (Includes 5k cash and Subscriptions).

Team members:

-Sumanth N lead 4AL21AI051

-Shalini B H 4AL21AI063

-Purshotham

-Reshma B H

The SYMBIOT Hackathon conducted at Vidyavardhaka College Mysore on the 5th and 6th of May 2023 proved to be a hub of innovation and collaboration. With a limited timeframe of 24 hours, teams of enthusiastic students enthusiastically dived into creating an innovative project that aimed to address societal challenges. Among these talented teams was one led by Sumanth N from Alvas Engineering College. With their combined efforts and dedication, the team developed a solution that showcased their technical skills, problem-solving abilities, and a deep understanding of the needs of the society. Their project not only impressed the judges but also left a lasting impact, highlighting the immense potential of young minds in driving positive change through technology.

Domain Choice:

The SYMBIOT is a 24-hour build challenge organized by the Department of ECE at Vidyavardhaka Engineering College, Mysuru, provided participants with the above mentioned track and our team decided to choose open innovation and the topic we got under this where sign language detection and real time image recognization

Abstract

The Sign Language Detection and Real-Time Image Recognition project, developed as part of the SYMBIOT , aimed to create a comprehensive solution that addresses both the communication needs of the deaf and hard of hearing community and the real-time image recognition requirements across various industries. This report provides a detailed overview of our project, including problem understanding, methodology, results, and future potential.

Problem Statement

Our project tackled two significant challenges:

1.Sign Language Detection: To develop a system capable of recognizing and translating sign language gestures into text or spoken language in real-time.

2.Real-Time Image Recognition: To create a solution that can accurately identify objects, people, and scenes from live camera feeds or static images with high accuracy and efficiency.

Methodology

Sign Language Detection

Data Collection and Preprocessing

We curated a diverse dataset of sign language gestures, covering various signs, hand shapes, and facial expressions, and annotated each gesture with its corresponding text or spoken language translation.

Data preprocessing included noise removal and normalization of hand positions and gestures for consistency.

Model Development

We implemented a custom Convolutional Neural Network (CNN) architecture trained on the preprocessed dataset.

The model was integrated into a system that processes live video input for real-time sign language interpretation and translation.

Real-Time Image Recognition

Data Collection and Preprocessing

We collected a vast dataset comprising thousands of images across numerous categories, meticulously annotated for accurate labeling.

Data preprocessing included resizing, normalization, and augmentation to enhance model robustness.

Model Development

Utilizing state-of-the-art deep learning techniques, we employed a Convolutional Neural Network (CNN) architecture, achieving high recognition accuracy.

The model was integrated into an intuitive user interface for real-time image recognition, capable of processing live video feeds and static images.

Results and Evaluation

Sign Language Detection

Testing demonstrated impressive accuracy, with an average recognition accuracy rate.

Users appreciated the real-time translation capabilities, highlighting its potential to bridge the communication gap for the deaf and hard of hearing community.

Real-Time Image Recognition

Our Real-Time Image Recognition system achieved remarkable accuracy, surpassing an average recognition accuracy rate of [percentage].

User feedback emphasized the system's broad applicability across industries and use cases.

Ethical Considerations

Throughout the project, ethical considerations were paramount. We ensured user privacy, data security, and addressed potential biases in the data and models to uphold fairness and inclusivity.

Conclusion

The Sign Language Detection and Real-Time Image Recognition project, developed during the SYMBIOT , represents an innovative leap forward in the fields of accessibility and computer vision.

Our solution empowers both the deaf and hard of hearing community and various industries with the capabilities of real-time language interpretation and visual recognition.

This project showcases the immense potential of combining diverse technologies and is a testament to the transformative possibilities enabled by hackathons like SYMBIOT .