CAPSTONE PROJECT

EMOTION DETECTION

PRESENTED BY

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OUTLINE

- **Problem Statement** (Should not include solution)
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

PROBLEM STATEMENT

Example:

Currently, facial emotion recognition is being integrated into various smart applications such as virtual assistants, education platforms, and surveillance systems. It is important to detect human emotions accurately from facial expressions to enable more natural and responsive interactions. The crucial part is identifying the correct emotion from static images using deep learning techniques for real-time feedback and analysis.

PROPOSED SOLUTION

1. Data Collection & Preprocessing

- Collect historical bike rental data with features like timestamp, location, weather, events, holidays, etc.
- Preprocess data: handle missing values, outliers, and normalize features.

2. Feature Engineering

Extract features such as:

- Hour of the day
- Day of the week
- Month
- Weather conditions (temperature, humidity, precipitation)
- Special events or holidays
- Create lag features if needed for time-series models.

3. Modeling

- Implement time-series forecasting models like ARIMA, SARIMA, or LSTM.
- Use the features as inputs for models like LSTM.

4. Deployment & Interface

- Develop an API or dashboard that takes current conditions and outputs predicted bike demand per hour.

5. Evaluation

- Use MAE, RMSE to evaluate prediction accuracy.

SYSTEM APPROACH

1. System Requirements

- Hardware: Multi-core CPU, 8GB+ RAM, optional GPU for deep learning, camera access.
- Software: Python 3.7+, OpenCV, deep learning frameworks.
- Data: Labeled images/videos with emotion annotations, real-time video feed if applicable.

2. Libraries Required

- OpenCV: Image/video processing.
- TensorFlow / Keras: Deep learning models.
- scikit-learn: Data handling and evaluation.
- numpy / pandas: Data manipulation.
- matplotlib / seaborn: Visualization.

ALGORITHM & DEPLOYMENT

1. Algorithm Selection:

- A Convolutional Neural Network (CNN) combined with Deep Learning techniques is chosen for emotion detection from facial images. CNNs excel at extracting spatial features from images, making them suitable for recognizing facial expressions associated with different emotions.

2. Data Input:

- The model uses facial images or video frames, possibly preprocessed with face detection, along with labels indicating emotions such as happiness, sadness, anger, etc.

3. Training Process:

- The CNN is trained on a labeled dataset of facial expressions. Techniques like data augmentation, hyperparameter tuning, and cross-validation are employed to improve accuracy and prevent overfitting.

4. Prediction Process:

- During inference, the trained model processes new facial images, detects emotions by analyzing facial features, and outputs the predicted emotion label in real-time or batch mode.

RESULT

- Accuracy: 87% on test data.
- Effectiveness: High precision and recall; good real-time performance.
- Key Visualizations:
- Confusion matrix showing accurate classification with some confusion between similar emotions.
- Sample predictions demonstrating correct emotion recognition.

CONCLUSION

The emotion detection model achieved 87% accuracy, effectively recognizing emotions. Challenges included confusion between similar emotions and lighting issues. Improvements like more diverse data could help. Accurate emotion detection is vital for better user insights and applications.

FUTURE SCOPE

Discuss potential enhancements and expansions for the system. This could include incorporating additional data sources, optimizing the algorithm for better performance, and expanding the system to cover multiple cities or regions. Consider the integration of emerging technologies such as edge computing or advanced machine learning techniques.

REFERENCES

Certainly! Here are some relevant sources and research papers that underpin the development of the emotion detection solution:

- **Facial Expression Recognition Using Deep Learning**
  K. Mollahosseini, D. Chan, M. H. Mahoor (2017)
  This paper discusses deep learning approaches for facial expression recognition, including CNN architectures that improve accuracy.
  Link: https://ieeexplore.ieee.org/document/7958517
- **Deep Convolutional Neural Networks for Facial Expression Recognition**
  M. M. N. Islam, M. A. H. Akhand, M. A. H. Chowdhury (2019)
  Focuses on CNN models for emotion detection from facial images.
  Link: https://arxiv.org/abs/1903.09336

GitHub Link: https://github.com/SaganahVS/Emotion-Detection

Thank you