

1. Age and Gender Prediction

Age and gender prediction from live camera feeds is an advanced computer vision task that involves analyzing facial features in real time. This project leverages deep learning techniques, particularly convolutional neural networks (CNNs), to classify a person's age group and gender based on their facial characteristics. The system processes video frames captured from a live webcam, detects faces using a pre-trained face detection model (e.g., MTCNN, Haar Cascades, or SSD), and then classifies them into predefined age categories and gender labels.

The model is trained on publicly available datasets containing diverse facial images with labeled age and gender information. To enhance accuracy, data augmentation and transfer learning techniques are employed. The prediction pipeline consists of face detection, preprocessing, feature extraction, and classification. The final predictions are displayed in real time, providing an interactive experience.

2. Smart Shopping Assistant

The Smart Shopping Assistant is designed to enhance the shopping experience by providing personalized recommendations and real-time assistance. Leveraging technologies like artificial intelligence (AI) and natural language processing (NLP), the system analyzes user preferences, purchase history, and in-store behavior to suggest products tailored to individual needs. Features include a barcode scanner for product information, price comparisons, and nutritional details for grocery items. Integration with location services allows the assistant to guide users to specific aisles in physical stores. Additionally, the system supports voice commands and conversational AI to answer user queries, making it highly accessible. A recommendation engine, powered by machine learning algorithms like collaborative filtering or content-based filtering, ensures relevant suggestions. The assistant also enables users to create and manage shopping lists, set budgets, and receive alerts for discounts or restocked items. This innovative solution simplifies shopping, saving time and money while enhancing user satisfaction.

3. Credit Card Fraud Detection

This project aims to detect fraudulent credit card transactions using machine learning to enhance financial security. The system analyzes transactional data, including attributes like transaction amount, location, time, and merchant category, to identify anomalies. Preprocessing steps involve handling imbalanced datasets through techniques like SMOTE (Synthetic Minority Over-sampling Technique) or class weighting. Feature engineering focuses on creating derived variables, such as transaction velocity and spending patterns. Algorithms like random forests, gradient boosting (e.g., XGBoost), or deep learning models are trained to classify transactions as legitimate or fraudulent. The models are evaluated using metrics such as precision, recall, F1-score, and Area Under the Curve (AUC-ROC) to ensure robust performance. Real-time fraud detection is achieved by deploying the model on scalable platforms, enabling instant alerts for suspicious activities. By minimizing false positives and accurately identifying fraudulent transactions, this solution protects consumers and financial institutions, fostering trust in digital payment systems.