AI-Powered GAN Based AR Try-On for Fashion

# Abstract

The fashion industry is rapidly evolving with the integration of artificial intel- ligence (AI) and augmented reality (AR) technologies. This project focuses on developing an AI-powered virtual try-on system that allows users to visualize how clothing items would look on them without physically wearing them. Us- ing computer vision techniques, deep learning models, and AR frameworks, this project aims to enhance the online shopping experience and reduce product re- turn rates. By leveraging OpenCV, MediaPipe, and TensorFlow, the system detects body poses and overlays garments in real time. The project demon- strates the feasibility and efficiency of AI-powered virtual try-on solutions in e-commerce and retail applications. Additionally, we explore the application of Generative Adversarial Networks (GANs) such as VITON-HD to enhance the realism of virtual garment fitting.

# Project Objectives

* To develop an AI-based virtual try-on system that enables users to try clothing digitally.
* To utilize computer vision and AR technologies to enhance the online shop- ping experience.
* To integrate deep learning models for precise body segmentation and gar- ment overlay.
* To create an interactive user interface for real-time visualization.
* To explore the feasibility of deploying the system on mobile and web plat- forms using TensorFlow Lite and WebAR.

# Methodology

The methodology of this project involves several key steps. First, **data collection** is performed using publicly available datasets like DeepFashion2 and VITON-HD to train the model. Next, **preprocessing** is carried out by applying image segmentation techniques to extract clothing and human body features. Following this, **model training** is conducted using deep learning models such as VITON-HD and TryOnGAN for accurate body pose estimation and clothing transformation. The **integration** phase combines OpenCV, MediaPipe, and ARKit/WebAR to enable real-time virtual try-on. Finally, the **deployment** process involves developing a user-friendly web or mobile application using React Native and Flask, ensuring accessibility and efficiency for end users.

# Key Findings

1. AI-powered virtual try-on improves customer engagement and shopping ex- perience.
2. Deep learning models can accurately segment and overlay garments in real time.
3. Combining OpenCV and MediaPipe enhances the efficiency of pose estima- tion.

# Step-wise Solution Approach

## Step 1: Data Collection & Preprocessing

* + - Gather images from datasets like DeepFashion2 and apply image segmen- tation.
    - Use OpenPose or MediaPipe for pose estimation.

## Step 2: Model Selection & Training

* + - Use TensorFlow and VITON-HD for training a deep learning model for clothing overlay.
    - Train and fine-tune GAN models to improve garment realism.

## Step 3: AR Integration & Deployment

* + - Implement OpenCV and MediaPipe for pose tracking and real-time visual- ization.
    - Develop a React Native frontend and Flask backend for application deploy- ment.
    - Optimize for mobile devices using TensorFlow Lite and WebAR.

# References

[1] MUKAMBA, G. (2024). AI-POWERED VIRTUAL FASHION STYLIST WITH MACHINE LEARNING. i-Manager's Journal on Augmented & Virtual Reality (JAVR), 2(2).

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