AN ENTITY TO 3D MODEL PROTOTYPE FROM A PHOTO

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PROBLEM STATEMENT

This project endeavors to transform 2D facial images into detailed 3D prototypes through advanced feature extraction and modeling techniques. The resulting 3D models are then translated into G-code for practical applications in product design, Architectural Visualization, and Game Development. By innovatively bridging the gap between 2D Imagery and 3D Representation.

BACKGROUND

KH Teoh, RC Ismail, SZM Naziri, R Hussin, MNM Isa and MSSM Basir [3] described the overall procedure of developing this face recognition system from training the data using CNN approach to face recognition. It is verified that with the large number of face images being trained into a classifier can achieve accuracy of 91.7% in recognising image and 86.7% in real-time video.

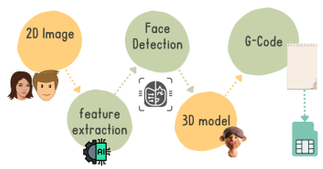
Victoria M Baretto [9] proposed is based on learning a point mapping from local image attributes to scene-depth. The other method is based on globally estimating the entire depth field of a query directly from a repository of image+depth pairs using nearest-neighbor-based regression.

PROJECT REQUIREMENTS/ PRODUCT FEATURES

Import necessary libraries: Flask, request, werkzeug, face_recognition and Image from PIL.
Configuration: Define the upload folder and allow file extensions for managing incoming images.
Initialization: Create empty lists to store known face encodings and corresponding names for recognition.
Face Recognition:
Utilize the face recognition library to recognize and extract faces from the uploaded images.
Image Processing: Process the extracted faces using PIL for further analysis and modeling.
Data Storage: Organize the recognized face encodings and names for subsequent steps in the process.

DESIGN APPROACH / METHODS

Basically, first we made use of Multi-task Cascaded Convolutional Networks (MTCNN) which is a crucial tool for face detection and feature extraction from the input photos, enabling the identification and transformation of facial features into 3D models.



The methodology for converting a 2D face from an image to a 3D virtual prototype involves leveraging computer vision and facial recognition algorithms to extract key facial features from the 2D image. Subsequently, these features are used to generate a three-dimensional representation, employing techniques such as 3D modeling and mesh reconstruction to create a lifelike virtual prototype of the original face.

Tools like Matplotlib, Keras and TensorFlow, NumPy are being used

RESULTS & DISCUSSION

The system demonstrated commendable performance in transforming 2D facial images into virtual 3D prototypes and generating G-code for 3D printing. The key outcomes are Facial Recognition, 3D Model Realism, STL File Generation, G-code Extraction, User Interaction and Interface

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SUMMARY OF THE PROJECT OUTCOME

The above are the snapshots of the 3D model output in stl format of the 2D image given as an input

CONCLUSION & FUTURE WORK

The system effectively converts 2D facial images into realistic 3D prototypes, generating G-code for 3D printing. The face recognition algorithm accurately identifies and extracts facial features, resulting in high-quality 3D models. STL file generation and G-code extraction ensure compatibility with 3D printing technologies. The user-friendly interface and scalability make the system suitable for various industries. This versatile tool bridges the gap between 2D and 3D, providing a streamlined solution for 3D modeling from facial images.

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