HCMC UNIVERSITY OF SCIENCE – VNUHCM

FACULTY OF INFORMATION TECHNOLOGY

INTRODUCTION TO SOFTWARE ENGINEERING – 22CLC02

PROJECT ASSIGNMENT 0 (PA0)

Application Project:

2D IMAGE TO 3D MODEL FOR MODELING

Group: 01

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Group Number: 1

Product Name: Pic2Model

Problems (Pain points)

- **Lack of Visual Tools in Education**: Teachers and students struggle to find and use visual tools that effectively illustrate complex concepts, hindering the teaching and learning process. Educational equipment and models can be expensive and are not always easily accessible, especially in rural or underfunded areas.
- **Lack of Realistic Experiences in E-commerce**: Online shoppers cannot have realistic interactions with products before purchasing, leading to inaccurate buying decisions and potential dissatisfaction. Customers can't experience products from multiple angles or test features before making a purchase.
- **Lack of Time and Money for Travelling**: Many people want to explore the world but are limited by time and financial constraints. Not everyone can afford diverse travel experiences.
- **Challenges in Design**: Artists and designers often face difficulties in creating accurate and realistic 3D models. Existing tools may be complex or not fully support creative needs.

Solutions

- **Education**: Create Interactive 3D Models: Develop a platform where educators can access and create interactive 3D models related to their curriculum. For instance, biology teachers could use detailed 3D models of the human body to explain complex anatomy.
- **Shopping Experience**: Customizable 3D Product Views: Offer detailed, 360-degree views of products with options for customization, helping customers make informed decisions by examining every aspect of a product.

- **Tourism**: Virtual Travel Experiences: Provide immersive experiences with background information, historical context, and interactive elements, giving users a rich understanding of the places they visit virtually.
- **Design**: AI Powered Design Tools: Create AI tools that assist designers by suggesting improvements, automating repetitive tasks, and providing resources for creating accurate 3D models quickly.

Core Features

- **3D Model Creation from 2D Images and Descriptions**: Transform 2D images or textual descriptions into detailed 3D models, catering to needs in education, shopping, tourism, and art-related activities. This allows users to visualize and interact with complex concepts and objects.
- **AI-Driven Image Generation**: Use AI to generate images from user-provided text descriptions. This feature helps users to easily visualize their ideas without needing extensive design skills, making the platform more accessible.
- **Object Segmentation in Images**: Enable object segmentation in images for instances where only specific elements need to be converted into 3D models. This allows users to isolate and focus on objects within an image, creating precise and targeted 3D representations.
- **Interactive 3D Experiences**: Provide users with immersive experiences by allowing interaction with generated 3D models on the website. This includes functionalities like rotating, zooming, and manipulating the models for an in-depth exploration, enhancing their understanding and engagement.

Real-world Use-cases

1. Real-life knowledge for students

Teacher T is passionate about providing engaging and practical lessons to their students. They believe that hands-on learning experiences are crucial for understanding complex

concepts. However, the cost and accessibility of physical models for certain subjects make it challenging to bring these concepts to life in the classroom. By integrating advanced 3D modeling tools into the curriculum, Teacher T can create detailed and interactive visual aids. These 3D models allow students to explore and interact with concepts in a virtual environment, making abstract ideas more tangible and comprehensible. Whether it's a 3D model of the human heart for a biology lesson or a simulation of a historical event for a history class, these tools make learning more vivid and engaging.

2. The quality of 3D products

Architect A often works on creating detailed 3D models for various projects, including advertising, product design, and animations. However, the tools currently available sometimes fail to capture the level of detail and precision needed to meet the client's expectations. By leveraging advanced 3D design software with high-resolution capabilities, Alex can achieve a new level of precision and detail in his work. Features such as customizable textures, lighting effects, and AI-driven enhancements allow him to create stunningly realistic models that meet the exact specifications of his clients.

Competitors

- Alpha3D
- CSM AI
- Image to STL

Our Differences

- **Customization**: Allow users to adjust parameters such as texture, lighting, and scale, enabling them to create more realistic and personalized 3D models.
- **AI Integration**: Utilize AI to generate images and 3D models from text descriptions, making it easier for users to visualize their ideas without needing technical expertise.

- **Versatile Output Formats**: Offer multiple output formats like .ply, .obj, .stl, and high-resolution images, providing flexibility for users to utilize the models in various applications.
- **User Storage and Sharing**: Users can store files and retrieve images whenever needed and the website also enables sharing of models and images with other users through the website, fostering a collaborative community.
- **URL and Clipboard Image Handling**: Accept and process URLs or clipboard content containing images to generate similar products, providing convenience equivalent to direct image uploads.