1. Title of the Project

AI-Based Skin Cancer Prediction Model

2. Objective of the Project

This project aims to develop an AI-driven model that can accurately detect and classify skin cancer based on image inputs. By leveraging deep learning techniques, our model aims to assist dermatologists and healthcare professionals in early diagnosis, improving patient outcomes and treatment effectiveness.

Input:

1. Image of Skin Lesions:

High-resolution images of skin lesions, moles, or suspicious spots on the skin (typically taken with a smartphone or dermatoscope).

The images may be preprocessed or labeled (benign or malignant) for training purposes.

2. Patient Demographics (Optional):

Age, gender, and medical history (family history of skin cancer, sun exposure, previous melanoma, etc.).

This data can be used to refine predictions and improve model accuracy.

3. Clinical Data (Optional):

Information about the lesion such as shape, size, color, asymmetry, and irregular borders (may be extracted from the image).

Output:

1. Prediction of Skin Cancer Type:

Benign: The lesion is non-cancerous.

Malignant: The lesion is likely to be cancerous (potential melanoma).

The model could further classify the type of cancer if needed (e.g., melanoma, basal cell carcinoma, squamous cell carcinoma).

2. Risk Level (Optional):

A categorized risk level (low, medium, high) based on the model's confidence in its prediction.

3. Confidence Score:

A percentage or probability score indicating the likelihood of the lesion being malignant or benign.

Modules:

1. Data Preprocessing & Augmentation:

OpenCV, Pillow, NumPy, scikit-image

2. Model Building & Training:

TensorFlow/Keras or PyTorch

3. Evaluation & Metrics:

scikit-learn, TensorBoard

4. Deployment:

Flask, FastAPI, TensorFlow Serving

5. Cloud & Hosting:

AWS, Google Cloud, Heroku

6. Version Control:

Git, GitHub

Process logic :Here's the shortened process logic for the AI-Based Skin Cancer Prediction Model:

1. Data Collection: Gather skin lesion images (labeled as benign or malignant) and optional clinical data.

2. Preprocessing: Resize images, normalize pixel values, and augment data to improve model robustness.

3. Feature Extraction: Use CNN (or pre-trained models) to automatically extract relevant features from images.

4. Model Building: Design and compile a CNN for classification, train it on the data, and validate the model.

5. Evaluation: Assess performance using metrics like accuracy, precision, recall, and F1-score.

6. Tuning: Adjust hyperparameters and perform cross-validation for optimal performance.

7. Deployment: Deploy the model via a web API (using Flask/FastAPI) for real-time predictions.

8. Monitoring: Continuously monitor and retrain the model as needed for consistent performance.

Limitations of the project :

The limitations of the AI-Based Skin Cancer Prediction Model are:

1. Data Dependency: Requires a large, diverse, and high-quality dataset for accurate training.

2. Image Quality: Model performance can degrade with low-resolution or unclear images.

3. Generalization: May not perform well on unseen skin types or rare cases.

4. Clinical Context: Cannot replace expert diagnosis; relies on images and may miss other critical health information.

5. Bias: Potential bias if the training dataset is not representative of different skin tones, ages, or demographics.

Tools ,platform and languages:

Python

Pandas

NumPy

OpenCV

TensorFlow/Keras

Scikit-learn

Flask

FastAPI

Git

GitHub

Matplotlib

Seaborn