

Breast Cancer Classification Web App – Documentation

CIE 555 – CIE 552

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1. Introduction

This project focuses on deploying a breast cancer classification model using deep learning. The model predicts whether a histopathology image is benign or malignant. The web app allows users to upload an image, and the model provides a prediction with associated confidence scores.

Tools Used:

- **Hugging Face Spaces:** Platform for hosting and deploying the model.
- **Gradio:** User interface for image input and displaying the results.

2. Project Overview

The project consists of a deep learning model trained on histopathology images, designed to classify breast cancer as either benign or malignant. The model uses a hybrid architecture that combines EfficientNetV2-S and Vision Transformer (ViT) for feature extraction. The model is hosted on Hugging Face Spaces and integrated with Gradio for user interaction.

3. Setup

3.1 Dependencies

To run the app locally or deploy it:

1- Install required libraries:

```
pip install torch torchvision gradio huggingface_hub
```

2- Clone or download the repository (if available).

3.2 Model Files

Ensure the following files are present:

- **Model checkpoint (best_phased_model_checkpoint.pth):** Pre-trained model weights.
- **HybridModel class:** The model definition file (model_definition.py).

3.3 Hugging Face Space

- Create a Hugging Face account.

- Deploy the model on Hugging Face Spaces by creating a new space and uploading the necessary files (including app.py and model files).

3.4 Gradio Interface

The Gradio interface is defined in the app.py file. It includes:

- Image input for uploading histopathology images.
- Output displaying the model's predictions and confidence scores.

4. Deployment on Hugging Face Spaces

4.1 Steps for Deployment

1. Create a Hugging Face Space:

- Go to [Hugging Face](#) and create a new space.
- Select **Gradio** as the framework.

2. Upload files:

- Upload the app.py, model files, and any other necessary resources (like the HybridModel class and the model checkpoint).

3. Set up the space:

- The app will automatically build and deploy once the files are uploaded.

4. Access the app:

- After deployment, Hugging Face will provide a public URL for the app.

4.2 Gradio UI

The Gradio interface allows users to:

- Upload an image.
- View the classification result and confidence scores.

4.3 Model Loading

The model is loaded in app.py using PyTorch. It is loaded into memory and used for inference when an image is uploaded. The following steps are followed:

1. **Model Initialization:** The model is loaded from the checkpoint file.

2. **Image Preprocessing:** The input image is resized and normalized to match the model's expected input.
3. **Prediction:** The model predicts the class of the uploaded image, and Gradio displays the result.

5. How to Use the Web App

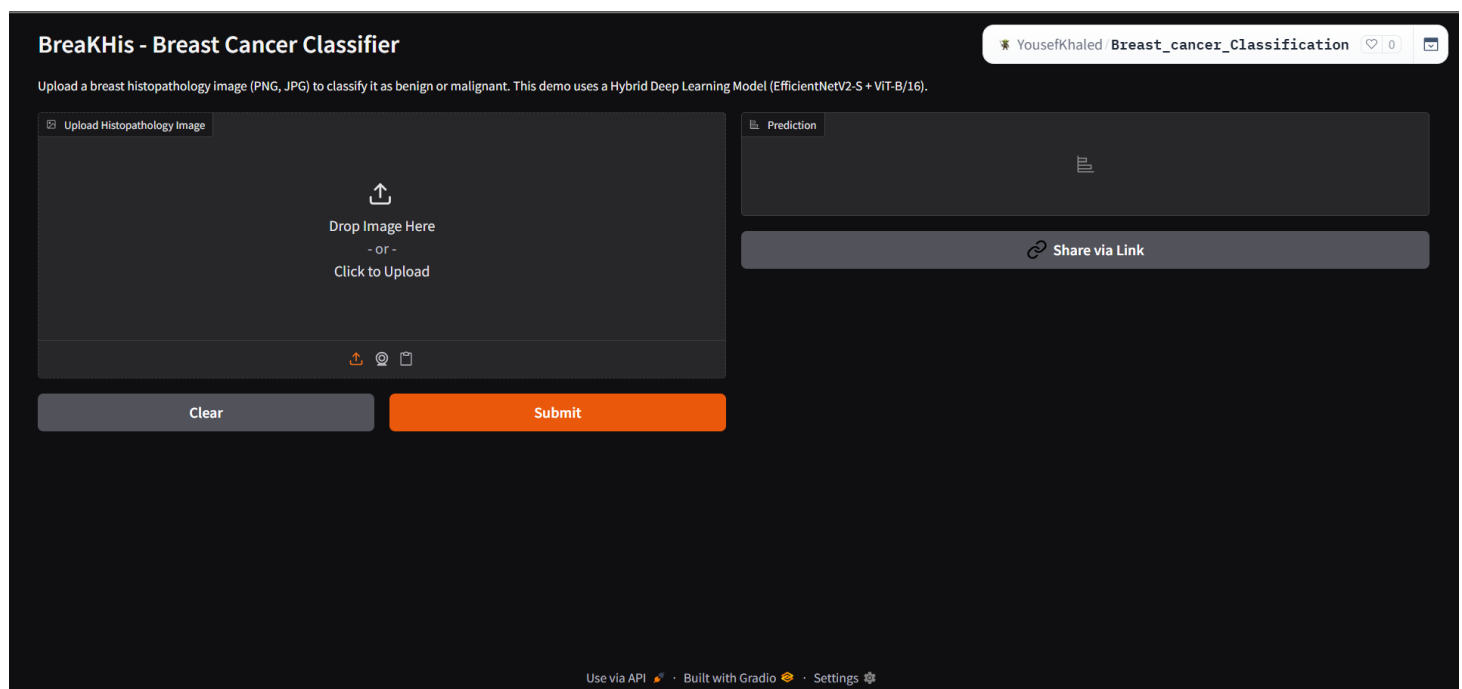
1. Go to the Hugging Face Space URL.
2. Upload a histopathology image (JPEG/PNG).
3. The model will predict whether the image is **benign** or **malignant**, along with the confidence score for each class.

Link: <https://yousefkhalel-breast-cancer-classification.hf.space/>

6. Conclusion

This web app demonstrates how to deploy a trained deep learning model for breast cancer classification using Hugging Face Spaces and Gradio. By exposing the model through a web app, users can interact with the model, making it an essential skill for real-world machine learning applications.

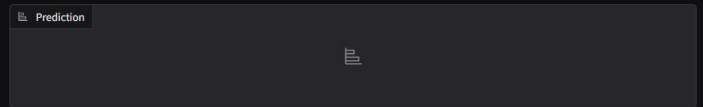
7. Samples



BreaKHis - Breast Cancer Classifier

YousefKhaled / Breast_cancer_Classification 0

Upload a breast histopathology image (PNG, JPG) to classify it as benign or malignant. This demo uses a Hybrid Deep Learning Model (EfficientNetV2-S + ViT-B/16).

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Clear

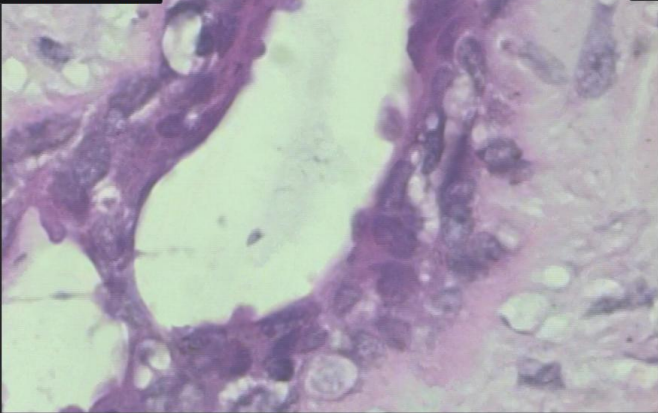
Submit

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Upload a breast histopathology image (PNG, JPG) to classify it as benign or malignant. This demo uses a Hybrid Deep Learning Model (EfficientNetV2-S + ViT-B/16).

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Upload Histopathology Image

Prediction

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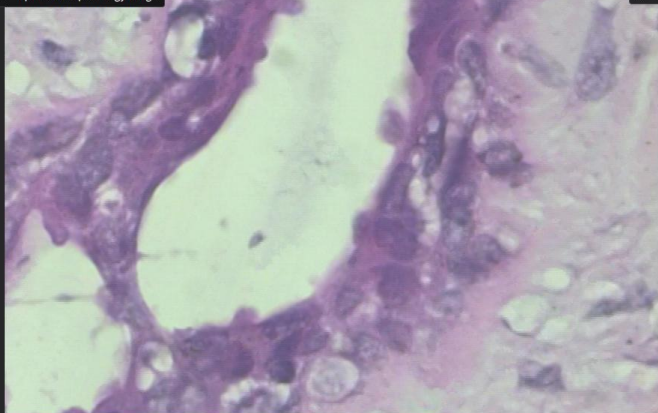
Clear Submit

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Upload Histopathology Image

Prediction

benign

benign	97%
malignant	3%

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