**Comparing Vision Transformer & Hiera Transformer for Skin Cancer Classification**

**Documentation & Installation Guide**

**Step 1: Set Up Google Colab**

1. Head to [Google Colab](https://colab.research.google.com).
2. Start new notebook
3. Switch to a T4 GPU runtime:
   * Click **Runtime** > **Change runtime type**.
   * Pick **T4 GPU** under **Hardware accelerator**.

**Step 2: Get the Dataset into Google Drive**

1. Grab the HAM10000 dataset (you can find it on Harvard Dataverse or similar sources).
2. Make sure you have:
   * HAM10000\_metadata.csv
   * HAM10000\_images\_part\_1.zip
   * HAM10000\_images\_part\_2.zip
   * All bundled in dataverse\_files.zip.
3. Upload dataverse\_files.zip to your Google Drive, say in a folder like MyDrive/DTSC 5082/.

**Step 3: Install the Tools You Need**

Colab comes with a lot of pre-installed libraries, but you’ll need a few extras. Pop this code into a cell at the top of your notebook and run it:

*# Install the necessary goodies*

!pip install -q torch torchvision torchaudio

!pip install -q transformers

!pip install -q pandas numpy matplotlib seaborn

!pip install -q scikit-learn

This sets us up with:

* torch, torchvision, torchaudio: For PyTorch and GPU magic.
* transformers: To use those fancy ViT models from Hugging Face.
* pandas, numpy: For wrangling data.
* matplotlib, seaborn: For making pretty plots.
* scikit-learn: For metrics like confusion matrices and ROC curves.

**Step 4: Connect to Google Drive**

To get the dataset, you’ll need to link your Google Drive. Add and run this cell:

from google.colab import drive

drive.mount ('/content/drive')

Follow the prompt to sign in and allow access. Make sure your dataverse\_files.zip is in the right spot (like /content/drive/MyDrive/DTSC 5082/dataverse\_files.zip).

**Step 5: Change the File Paths**

The code expects the dataset and model outputs to be in specific places. Double-check these paths in the notebook:

1. **Copying the dataset**:

!cp -r "/content/drive/MyDrive/DTSC 5082/dataverse\_files.zip" /content/

Update the path if your dataverse\_files.zip is somewhere else in your Drive.

1. **Metadata file**:

metadata\_path = "/content/HAM10000/HAM10000\_metadata"

This should be fine after unzipping, but confirm it matches the unzipped folder structure.

1. **Saving models**:

save\_dir = "/content/drive/MyDrive/DTSC 5082/best\_model\_google"

Change this to where you want to save your trained models.

**Step 6: Run the Notebook**

Now you’re ready to go! Run each cell in order. Here’s what happens:

* **Data Prep**: Unzips the dataset, loads metadata, and applies image transformations.
* **Model Setup**: Loads the ViT models and tweaks them for the 7 skin cancer classes.
* **Training**: Trains the models, using early stopping to keep things efficient.
* **Evaluation & Plots**: Checks model performance and shows graphs for loss, accuracy, and more.

Keep an eye on the output to catch any errors (like wrong file paths or memory issues).

**Step 7: Save Your Work**

* **Trained Models**: These get saved to your Google Drive in the save\_dir you set (e.g., /content/drive/MyDrive/DTSC 5082/best\_model\_google).