

Lab3: Image classification

XXXXXXX AI for Digital Health (2025/2)

Objective

- **Create & train** image classification model from teachable machine and pytorch library
- **Hyperparameter tuning** in model
- **Inference & evaluate** performance each model



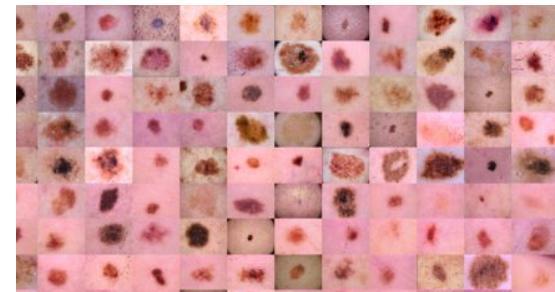
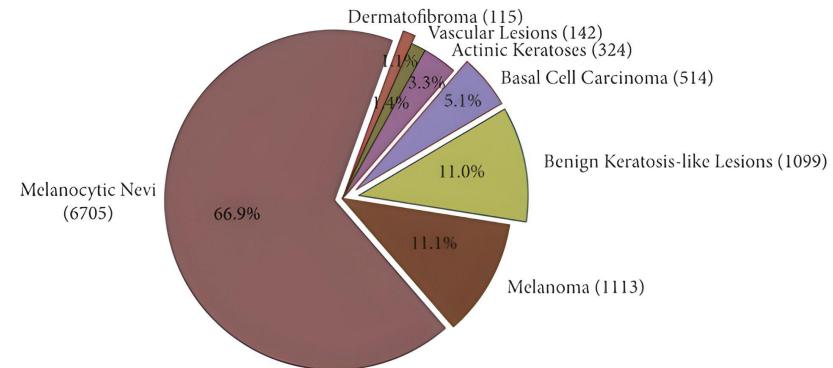
Material

- **Google Colab** is a free cloud-based platform that runs Jupyter notebook (Python code) in a browser, without needing local setup.
- **Teachable Machine** is a web-based tool by Google that trains machine learning models for images, audio, or poses without coding.
- **PyTorch, TensorFlow** is a deep learning library that enables building, training, and deploying neural networks using Python

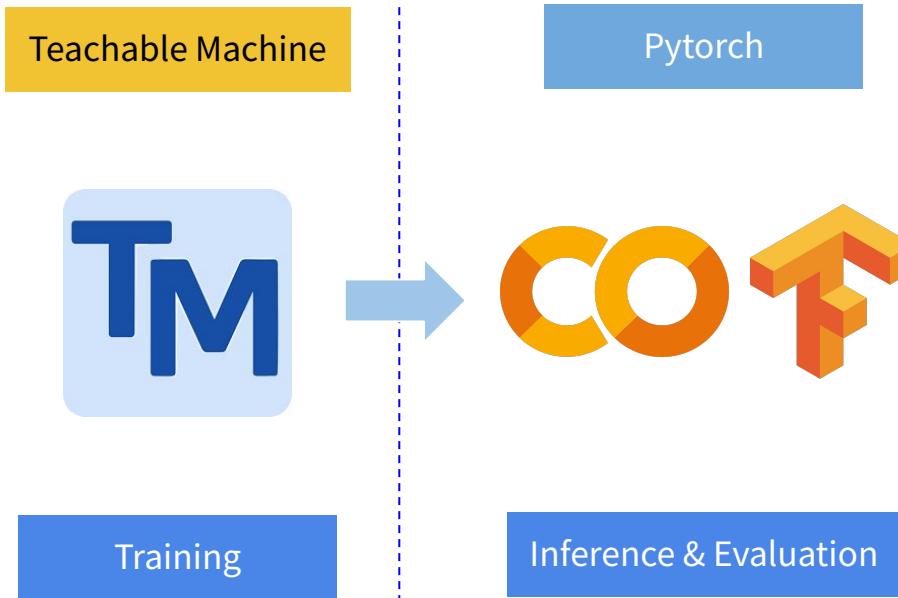


Dataset: Skin Cancer MNIST: HAM10000

- The dataset consists of 10015 images with 10013 labeled objects belonging to 7 skin cancer classes.
- The data contains image in JPG format and documents in JSON format
- In the experiment, we reduced the amount of data and formatted it to simplify the experiment.

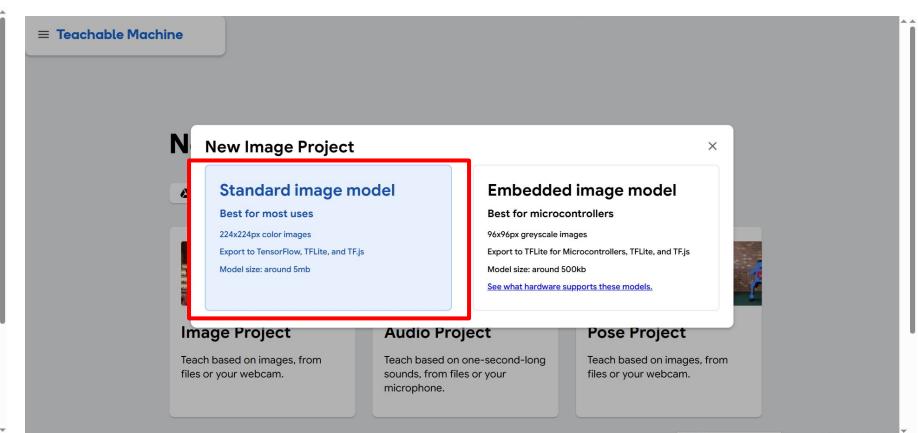
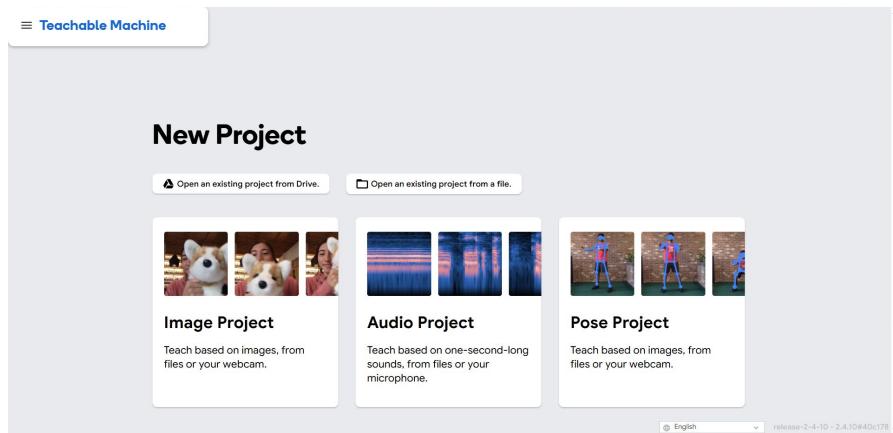


Lab3.1: MobileNet (Teachable Machine)



Lab3.1: MobileNet (Teachable Machine)

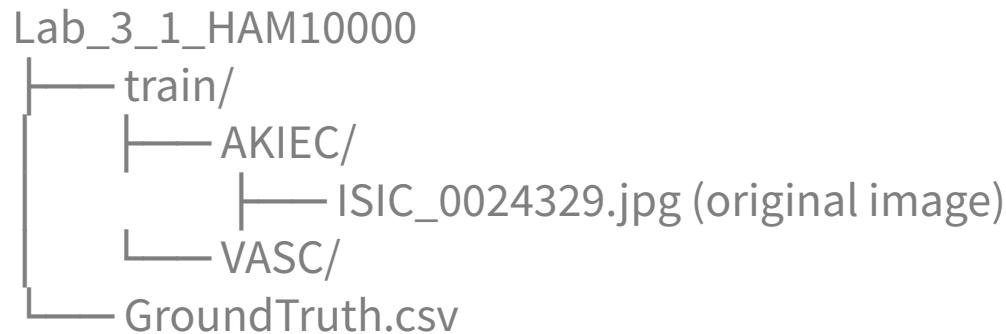
- 1) Create image project(standard image model) in Teachable Machine



Lab3.1: MobileNet (Teachable Machine)

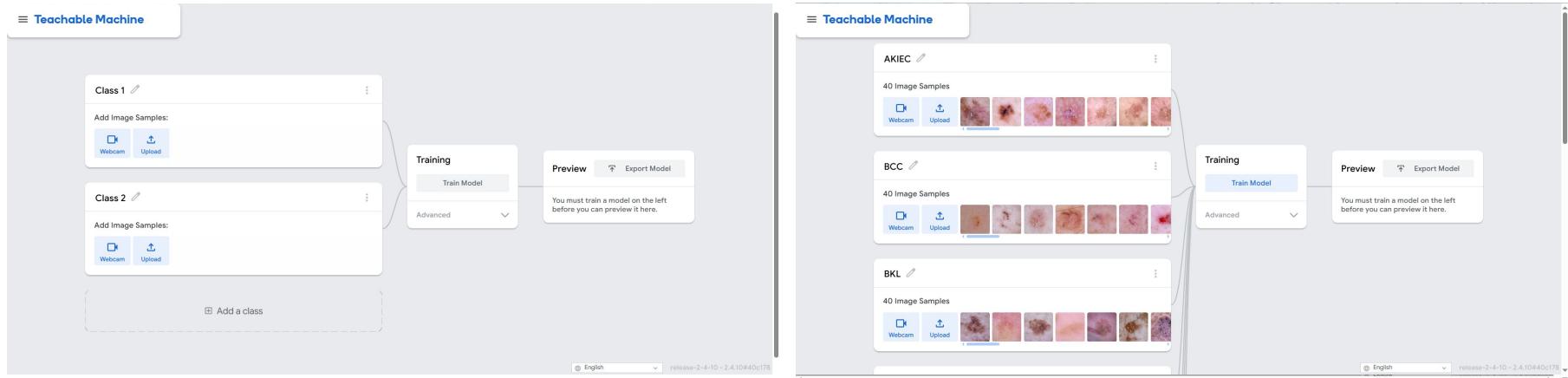
- 2) Add image sample and set label (Lab_3_1_HAM10000) into Teachable Machine

Lab_3_1_HAM10000 directory



Lab3.1: MobileNet (Teachable Machine)

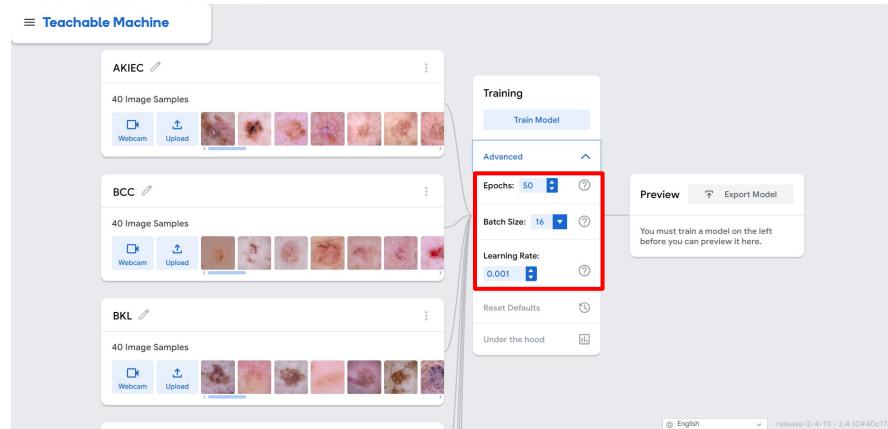
- 2) Add image sample and set label (code/Class03_IntroDL/Lab_3_1_HAM10000.zip) into Teachable Machine



Lab3.1: MobileNet (Teachable Machine)

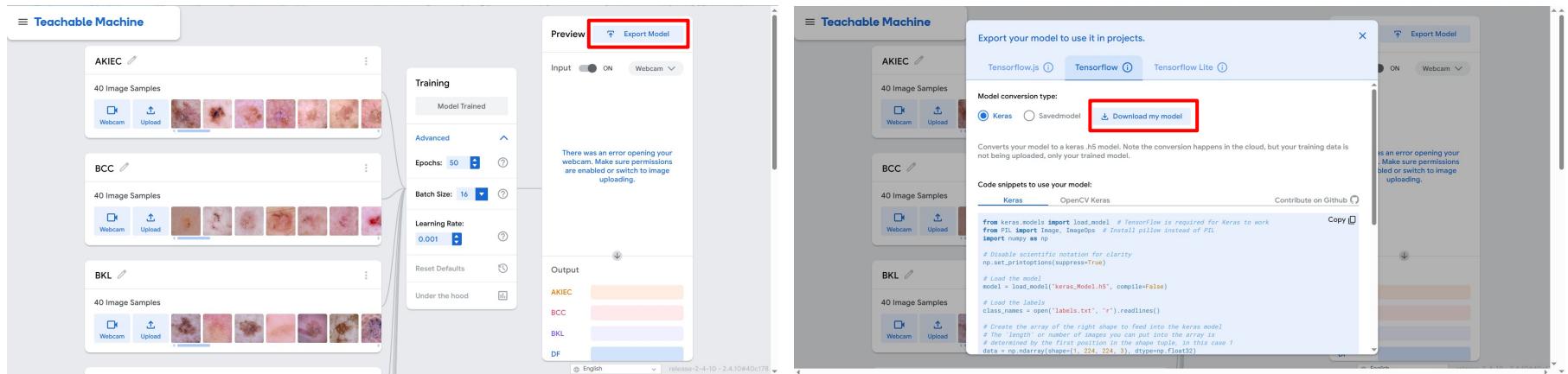
3) Tune learning parameter & Train model

- a) epoch: [5, 20, 50, 100]
- b) learning rate: [0.00001, 0.001, 0.1]



Lab3.1: MobileNet (Teachable Machine)

4) Export model (tensorflow version)



Lab3.1: MobileNet (Teachable Machine)

5) Open Lab_3_1_TeachableMachine.ipynb (in colab) and upload converted_keras.zip

The screenshot shows a Jupyter Notebook interface with the following details:

- Title Bar:** Lab_3_1_TeachableMachine.ipynb
- Toolbar:** File, Edit, View, Insert, Runtime, Tools, Help
- Header:** Share, Connect
- Section Header:** Lab 3.1 – Skin Cancer classification: MobileNet (Teachable Machine)
- Description:** This notebook is used to evaluate the performance of skin cancer classification models trained on Teachable Machine. Dataset consisting of 7 classes: Melanoma(MEL), Melanocytic nevi(NV), Basal cell carcinoma(BCC), Actinic keratoses(AKIEC), Benign keratosis lesions(BKL), Dermatofibroma(DF), and Vascular lesions(VASC)
- Text:** This example code will consist of:
 0. Setup
 1. Load Model
 2. Inference & Evaluate
- Section:** 0) Setup
- Description:** The code below download dataset, imports all required libraries and defines utility functions that will be used in the rest of this notebook.
- Code:**

```
# Download Prepared dataset from github
!wget https://github.com/pvateekul/digitalhealth-ai2025/raw/main/dataset/Lab_3_1_HAM10000.zip
!unzip -q -o 'Lab_3_1_HAM10000.zip'

# Download library
!pip install --upgrade tensorflow
```
- Bottom Navigation:** Variables, Terminal

Lab3.1: MobileNet (Teachable Machine)

6) Run Lab_3_1_TeachableMachine.ipynb for evaluation & inference.

label: MEL
output: BKL
confidence: 0.728



label: NV
output: BKL
confidence: 0.818



label: BCC
output: BCC
confidence: 0.979



label: AKIEC
output: BCC
confidence: 0.798



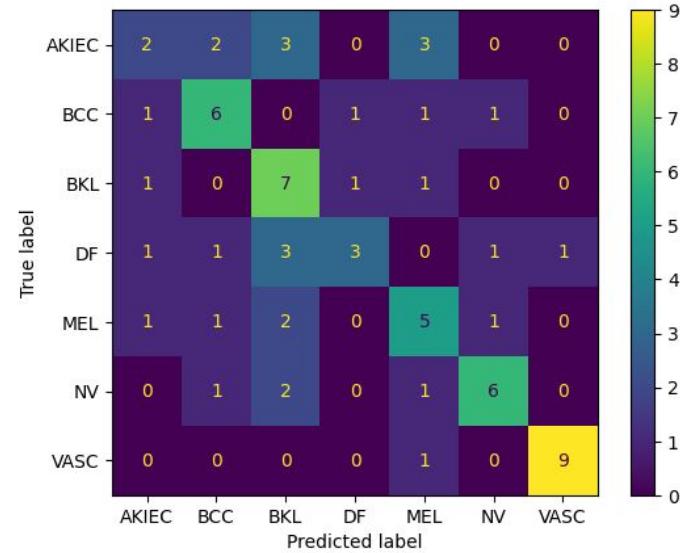
label: BKL
output: DF
confidence: 0.334



label: DF
output: BKL
confidence: 0.487



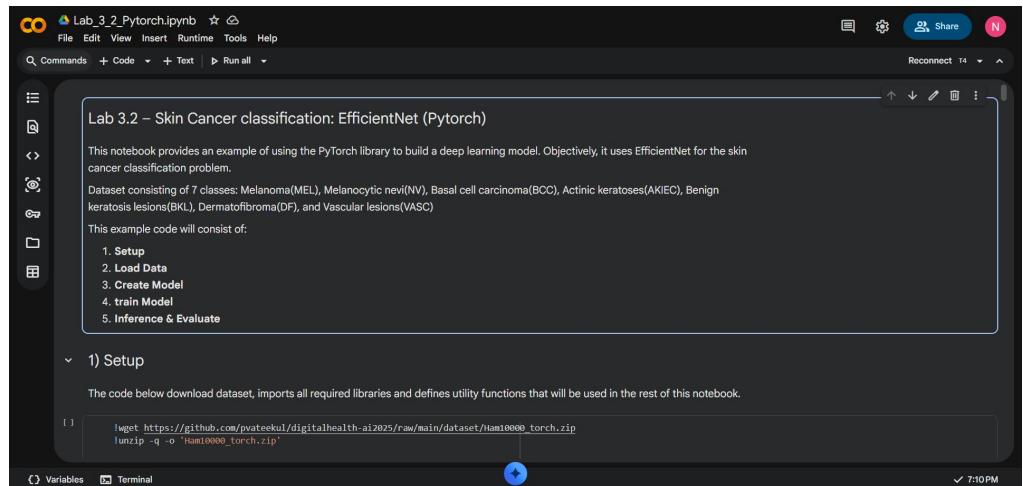
label: VASC
output: VASC
confidence: 1.0



Lab3.2: EfficientNet (Pytorch)

Run Lab_3_2_PyTorch.ipynb (in colab)

- 1) Setup
- 2) Load Data
- 3) Create Model
- 4) train Model
- 5) Inference & Evaluate



Lab 3.2 – Skin Cancer classification: EfficientNet (Pytorch)

This notebook provides an example of using the PyTorch library to build a deep learning model. Objectively, it uses EfficientNet for the skin cancer classification problem.

Dataset consisting of 7 classes: Melanoma(MEL), Melanocytic nevi(NV), Basal cell carcinoma(BCC), Actinic keratoses(AKIEC), Benign keratosis lesions(BKL), Dermatofibroma(DF), and Vascular lesions(VASC)

This example code will consist of:

1. Setup
2. Load Data
3. Create Model
4. train Model
5. Inference & Evaluate

1) Setup

The code below download dataset, imports all required libraries and defines utility functions that will be used in the rest of this notebook.

```
[ ] !wget https://github.com/pvateekul/digitalhealth-ai2025/raw/main/dataset/Ham10000_torch.zip  
!unzip -q -o Ham10000_torch.zip
```

