Div A

Preprocessing

All images were **downsampled to (600 × 600)** pixels to reduce I/O overhead and improve training efficiency.
Implementation details and preprocessing code can be found in:
(600-p-div-a.ipynb)

Models

1. EVA-X Base Model

Repository: [EVA-X (GitHub)](EVA-X)

- **Image Size:** 448 × 448
- **Training Setup:** The model was fine-tuned for **6 epochs** using the Div A dataset.
- **Initial Experiment:** Training on an **80/20 train–validation split** showed signs of **overfitting after epoch 6**.
- **Final Training:** The model was then **retrained on the full Div A dataset** for 6 epochs to fully utilize all available data and improve generalization.
- **Checkpoint Averaging:** The **5th and 6th epoch checkpoints** were averaged to form the final model, which achieved the **best validation and test performance**.

Training Methodology:

- **Layer-wise learning rates** were used so that deeper transformer blocks adapted faster than the earlier ones.
- A **combined Focal Loss + Binary Cross-Entropy (BCE)** loss function was employed to handle **class imbalance** and emphasize hard samples.
- **Mixed-Precision (AMP)** training improved computational efficiency and reduced memory usage.
- **Exponential Moving Average (EMA)** of weights stabilized training and enhanced convergence.

- **Strong data augmentations** (geometric, photometric, and dropout-based) were applied to improve robustness and reduce overfitting.

Code: (evax-recs-448-div-a.ipynb)
Model Weights: [EVA-X Div A models on Kaggle](#)

2. CheXFound Model

Repository: [CheXFound (GitHub)](#)

- **Image Size:** 512 × 512
- **Training Setup:** The model was fine-tuned for **6 epochs** in total.
  - **First 3 Epochs:** Trained using notebook: (all-data-chexfound-recs-div-a_3.ipynb)
  - **Next 3 Epochs:** Continued training from the epoch 3 checkpoint using: (all-data-chexfound-recs-div-a_6.ipynb)
- **Fine-Tuning Strategy:** Same methods as evax, but only the **GLoRIA head** was fine-tuned while the **backbone remained frozen**, unlike the EVA-X model where all parameters were fine-tuned.

Model Weights: [CheXFound Div A models on Kaggle](#)

Inference and Ensembling

For inference, predictions were generated from the following:

- **EVA-X Model:** Epochs 5 and 6 with **Test-Time Augmentation (TTA)**
- **CheXFound Model:** Epochs 5 and 6 **without TTA**

The final ensemble prediction was obtained by averaging the outputs of:

- EVA-X (epoch 5 + epoch 6 with TTA)
- CheXFound (epoch 5 + epoch 6)

This ensemble achieved the **best overall submission results**.

Full inference code is available in:
(all-models-inference-div-a.ipynb)

Note: The original code experimented with three-model combinations, but the final submission used only the **two-model average ((**EVA-X (epoch 5 + epoch 6 with TTA) and (CheXFound (epoch 5 + epoch 6)) **)**, as it achieved better performance, so I updated the inference code to just run the two models and to output the final submission the original inference code on kaggle took around 9 hours, after this update it will take just 7 hours.