

# Div B

## Overview

The same methods used for Div A were applied to Div B, but each division was trained exclusively on its respective dataset — Div B models used only the Div B dataset, and Div A models used only the Div A dataset, as requested.

## 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-b.ipynb)**

## Models

### 1. EVA-X Base Model

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

- **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-b.ipynb)

**Model Weights:** <https://www.kaggle.com/datasets/masry1/evax-448-models-div-b/data>

## 2. CheXFound Model

**Repository:** [CheXFound \(GitHub\)](#)

- **Image Size:**  $512 \times 512$
- **Training Setup:** The model was fine-tuned for **6 epochs** in total.
  - **First 3 Epochs:** Trained using notebook: (all-data-chexfound-recs-div-b\_3.ipynb)
  - **Next 3 Epochs:** Continued training from the epoch 3 checkpoint using: (all-data-chexfound-recs-div-b\_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:** <https://www.kaggle.com/datasets/masry1/models-all-data-chexfound-recs-xray-div-b/data>

## 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-b.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.