Fine-tuning RESNET for Cross Domain Applications

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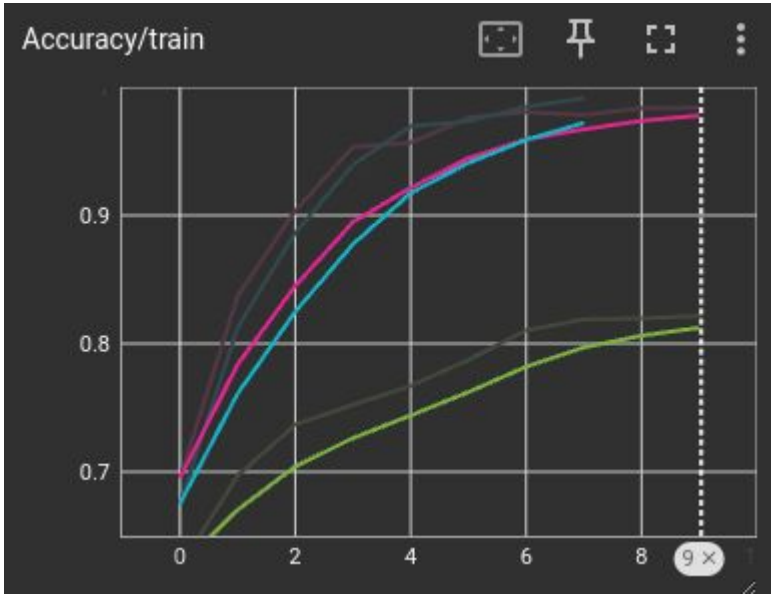
Goal

- Initially wanted to do graph neural networks for protein inference
  - PyTorch geometric demands standard size for input data tensor
  - Datasets all contained heterogeneous sizes for molecular structure
  - Could not construct adjacency matrix in format demanded by PyTorch graph in reasonable computational time
  - Switched goals
- New goal:
- Fine-tuning RESNET for multiple tasks

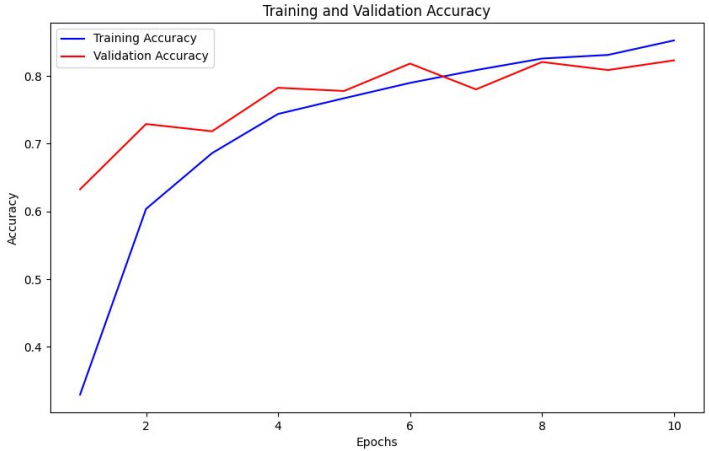
Problem 1 Overview

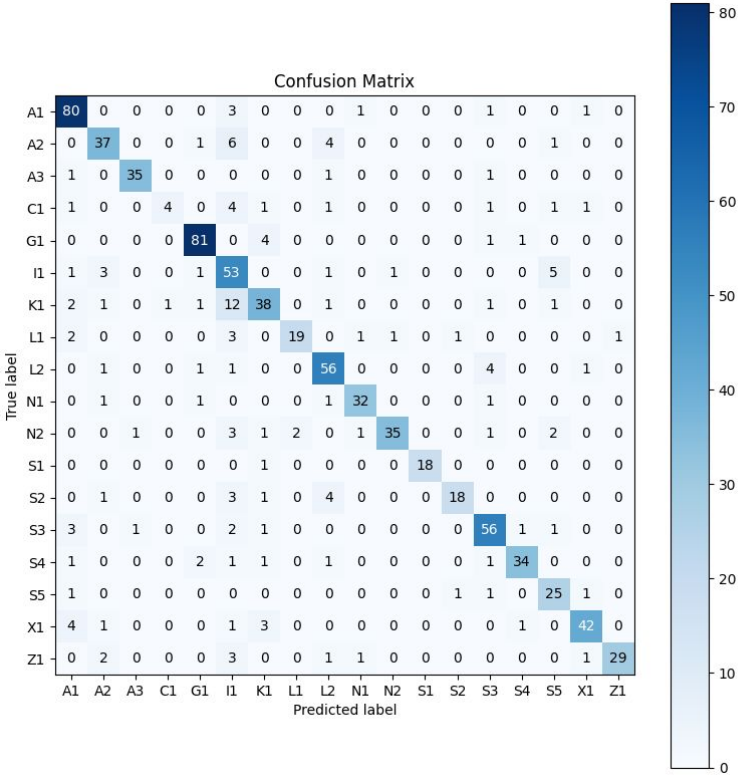
- Aim: Classify hand-drawn art for sorting or authorship detection
- Challenge: RESNET trained on physical images, not drawn
    - Physical images often have fairly even balance between width and height
    - Artists can use very abnormal dimensions
- Solution: Normalize to largest dimension and pad with black
- Dataset: Custom

Binary classification



Multiclass classification





Problem 2 Overview

- Aim: Classify all subjects present in photo
- Challenge: Different loss function in multilabel setting
- Solution: treat output as vector of binary states, then treat as many binary classification tasks
- Dataset: https://bigearth.net/

Results

TBD

Problem 3 Overview

- Aim: Domain-transfer RESNET for image segmentation to classify flooded areas
- Challenge: Need to adjust loss function again, also needs a decoder layer
- Solution: Add decoder, sum loss over image
- Dataset: https://www.kaggle.com/datasets/faizalkarim/flood-area-segmentation

Results

TBD