Images In Model Out

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One More Epoch

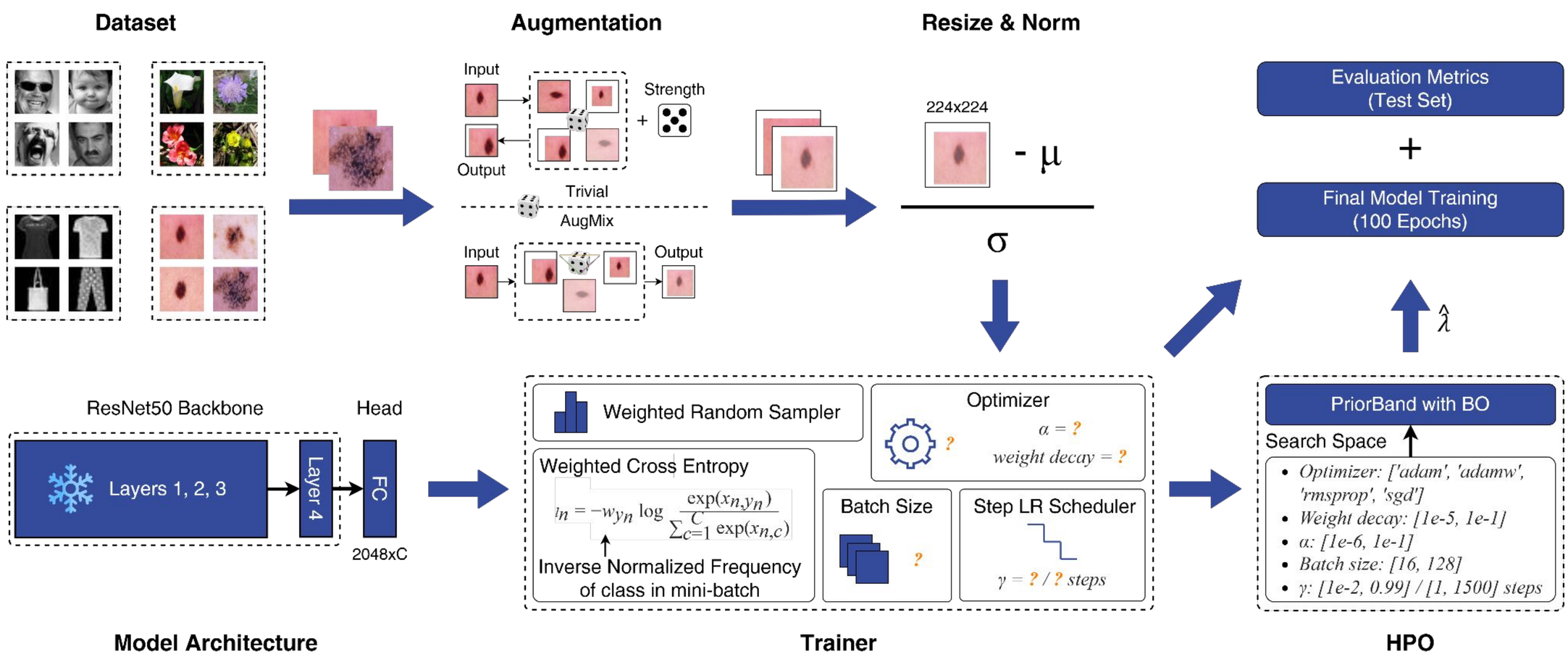
Modality 2/2

Introduction

This work is conducted for Automated Machine Learning (AutoML) to image classification using NEPS for Hyperparameter Optimization(HPO) with PriorBand Bayesian Optimization algorithm. Leveraging ResNet-50 with pretrained weights, our pipeline was evaluated on four datasets: Skin Cancer and Flowers (RGB images) and Fashion and Emotions (grayscale images). This one-click optimization solution, when given a dataset, automatically delivers the model with the lowest validation loss.

- Week 1
- Week 2
- Week 3
- Week 4
- Week 5
- Week 6
- Week 7
- Week 8
- Week 9
- Bonus
- Literature

Method



Resources Used

For development:
- 4 Tesla V100 GPU
- 3 P100 GPU (Kaggle)
- Total compute estimate: 170 GPU-h

For AutoML:
- 1 Tesla V100
- 23h

Workforce:
- 1 full week on average

Number of queries for test score generation: **1**

Quantitative Results

Figure 1 - Training Curves of Final Models

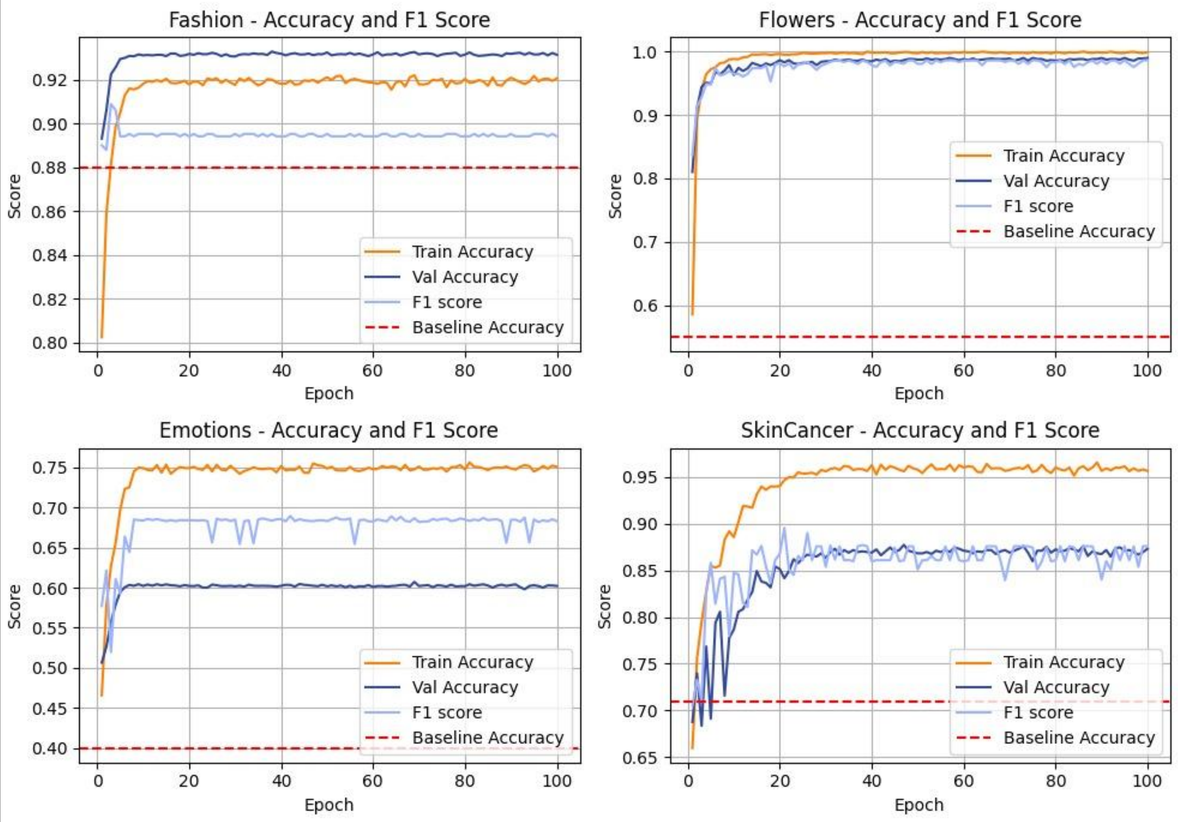


Table 1: Metrics for Datasets

Dataset	Loss	Accuracy	F1 Score
Fashion	0.2092	0.9264	0.8227
Flowers	0.0944	0.9832	0.9848
Emotions	1.0858	0.6054	0.4297
Skin Cancer	-	0.8536	0.7762

Figure 2 - Incumbent Curves

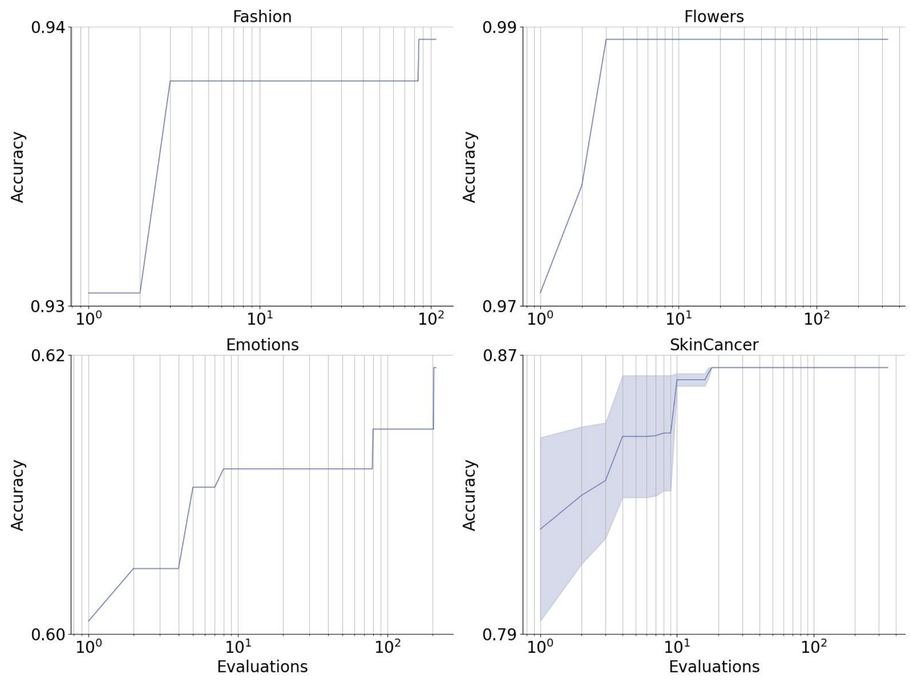
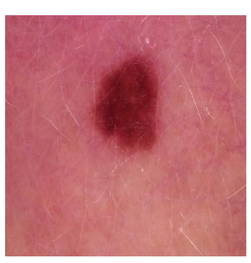


Table 2: Greedy Ablation Study on Skin Cancer Dataset using Surrogate Model

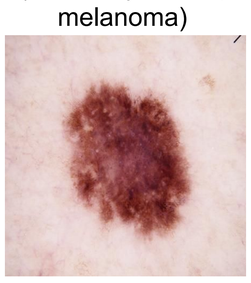
Step	Configuration	Loss
1	{'bs': 64, 'opt': 'adamw', 'lr': 0.001, 'wd': 0.00013, 'ss': 1000, 'sg': 0.1}	0.577
2	{'bs': 64, 'opt': 'adamw', 'lr': 0.001, 'wd': 0.00013, 'ss': 1000, 'sg': 0.54}	0.523
3	{'bs': 64, 'opt': 'adamw', 'lr': 0.001, 'wd': 0.00013, 'ss': 418, 'sg': 0.54}	0.511
4	{'bs': 46, 'opt': 'adamw', 'lr': 0.001, 'wd': 0.00013, 'ss': 418, 'sg': 0.54}	0.494
5	{'bs': 46, 'opt': 'adamw', 'lr': 0.0064, 'wd': 0.00013, 'ss': 418, 'sg': 0.54}	0.489
6	{'bs': 46, 'opt': 'adam', 'lr': 0.0064, 'wd': 0.00013, 'ss': 418, 'sg': 0.54}	0.495

Qualitative Results (Actual, Predicted)

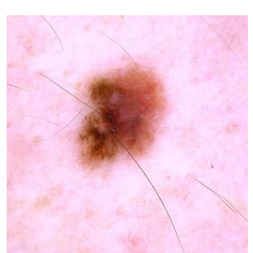
(5, 5) (melanocytic nevi)



(5, 4) (melanocytic nevi, melanoma)



(4, 4) (melanoma)



(40, 40)