

Cancer Classification Challenge 2023

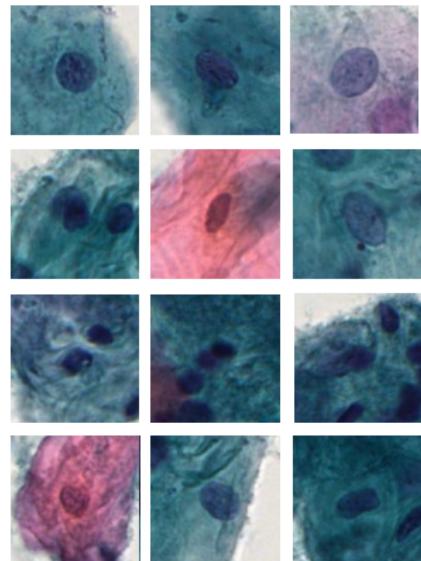
DL4IA - Group 3

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Outline

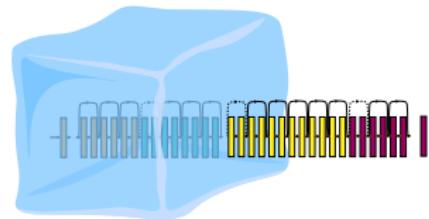
- What worked - Transfer learning
- What didn't work - Contrastive learning
- Results



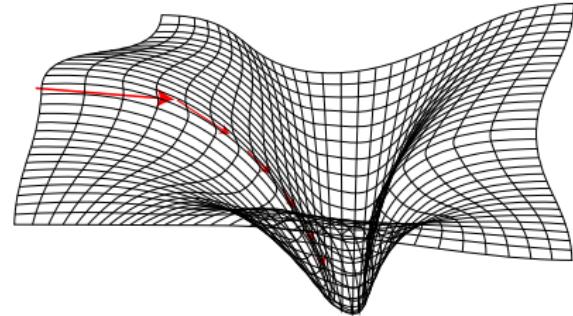
Benign or malignant?

Transfer learning

- Pre-trained on ImageNet
 - ResNet50
 - Freeze & unfreeze layers
- Learning rate strategy
 - Decrease step-size 90% every 5th epoch
- Regularization
 - Data augmentation
 - L2



Freezing parts of ResNet



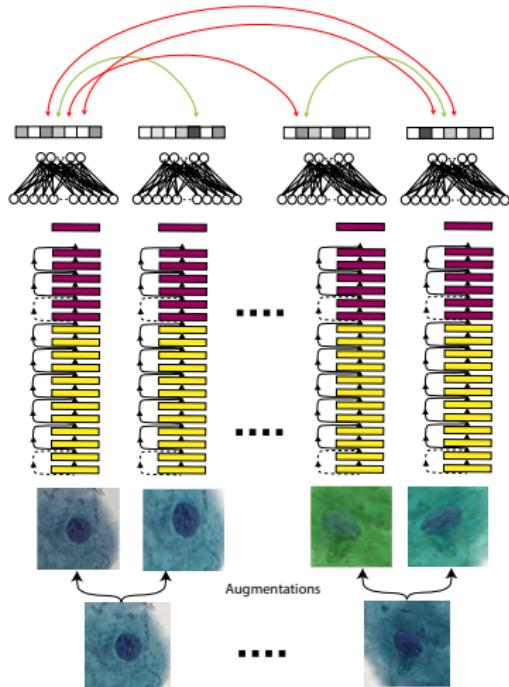
Changing Learning Rate

Hyperparameters

Hyperparameter	Value
Batch Size	32
Random Rotation Range	-45 to 45 degrees
Random Resize Crop Scale Range	0.5 to 3
Loss Function	Cross-Entropy Loss
Optimizer	Adam
Learning Rate	0.1
Scheduler Step Size	5
Scheduler Gamma	0.1
Regularization Strength	0.01
Number of Epochs	20

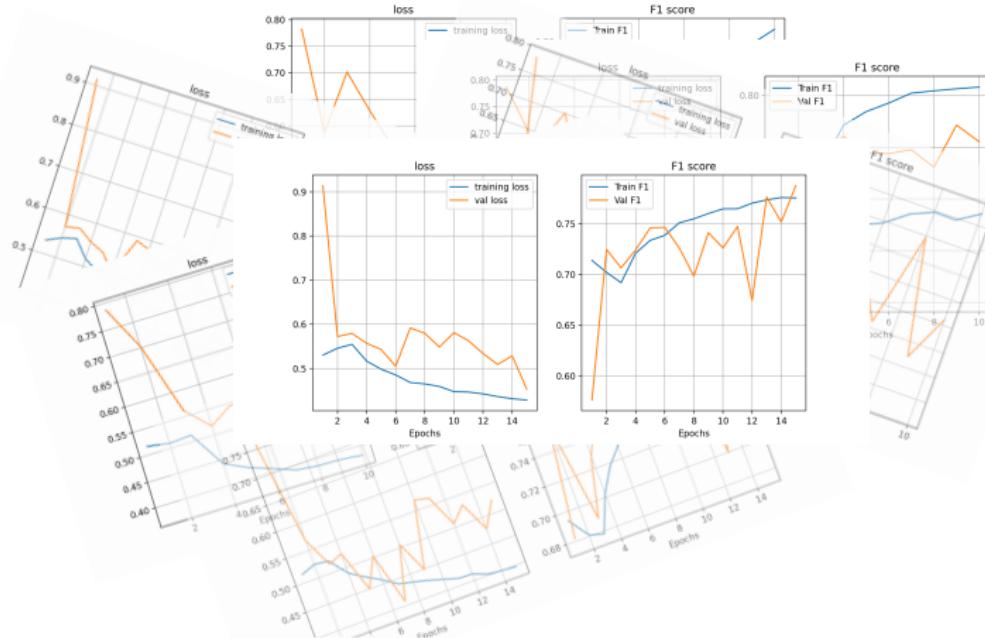
Contrastive learning

- SimCLR
 - ResNet 50 architecture
 - Remove FC classification layer
 - Replace with Projection head [1]
- Train on unlabeled data
 - InfoNCE loss [3]
- Transfer learning
 - Classification head
 - Layer-wise unfreezing
 - Early stopping



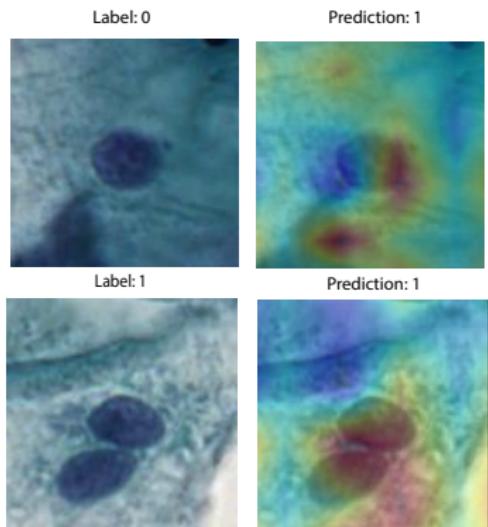
Hyperparameter	Value
Batch Size (train, validation, test)	16
Number of Epochs	15
Initial Learning Rate	5e-4
Step Size (LR scheduler)	3
Gamma (LR scheduler)	0.8
Optimizer	Adam
Weight Decay (Optimizer)	1e-3
Class Weights	[0.33, 0.67]
Loss Function	CrossEntropyLoss
Transformations	HorizontalFlip, GaussianBlur, Rotation ColorJitter

A lot of training later ...



Results

Model	AUC score
Transfer Learning	0.904
Contrastive learning	0.848



CAM generated with the best model

References I

- [1] Ting Chen and Simon Kornblith and Mohammad Norouzi and Geoffrey E. Hinton (2020). A Simple Framework for Contrastive Learning of Visual Representations
- [2] Santisudha Panigrahi and Bhabani Sankar Nanda and Ruchi Bhuyan and Kundan Kumar and Susmita Ghosh and Tripti Swarnkar (2023). Classifying histopathological images of oral squamous cell carcinoma using deep transfer learning
- [3] Aaron van den Oord and Yazhe Li and Oriol Vinyals (2019). Representation Learning with Contrastive Predictive Coding