

AI and Life Science



Microscopy Image Challenge

Muhammad Ammaduddin Qazi
K12343657

Data Preparation

Objective

Combine three grayscale images (nucleus, microtubules, endoplasmic reticulum) into one RGB image.

Process

- Loading Images: Load the three grayscale images for each sample.
- Merging Images: Merge the grayscale images into one RGB image, with each grayscale image assigned to a specific RGB channel.
- Saving Images: Save the combined RGB image in a designated folder for training and testing..

Outcome

RGB images are stored and ready for use in model training and prediction

Data Loading

Transformations

- Resize: Images resized to 224x224 pixels.
- Normalization: Applied to match the pre-trained model's input requirements (mean: [0.485, 0.456, 0.406], std: [0.229, 0.224, 0.225]).

Data Splitting

- Training Set: 80%
- Validation Set: 20%

Data Loader

- Dataset Class: Custom class to load images and labels, apply transformations.
- Batch Size: 32.
- Shuffling: Enabled for the training set to ensure random sampling.

Model Setup and Hyperparameters

Model Choice

- EfficientNetB0, selected for its efficiency and performance.
- Classifier Modification: Final layer replaced with a fully connected layer matching the number of cell line classes (9).

Hyperparameters

- Optimizer: AdamW
- Learning Rate: 1e-4
- Loss Function: CrossEntropy
- LossScheduler: StepLR with step size of 7 and gamma of 0.1 to reduce the learning rate periodically.
- Epochs: 10

Prediction and Results

Model Loading

- The best-performing model, saved after epoch 7, is loaded for prediction.

Test Data Prediction

- The combined test images are fed into the model.
- Predictions are made, and the predicted cell lines are recorded.
- Predictions are saved in a CSV file with columns: file_id and cell_line.

Score

17	StartedFromTheBottomNowWeHere	0.87	3	3 mins ago
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Experimentation

VisionLSTM

- The original classifier head of the VisionLSTM model was replaced to adapt it to our specific task of classifying 9 cell lines.
- Result:
VisionLSTM was trained on the dataset for 10 epochs, achieving a balanced accuracy of 0.65.