

Interferon- γ induction of GBP5 in HeLa cells

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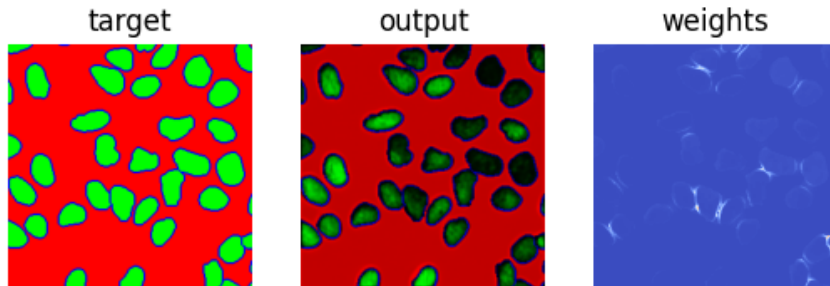
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Summary

- ▶ 10× 10 grid acquisition of DAPI, GAPDH, GBP5 in HeLa cells on #1.5 chambered coverglass
- ▶ Cell segmentation using UNET implementation in PyTorch
- ▶ Spot detection using LoG filter
- ▶ Spot calling using Fisher information filter
- ▶ Kinetic models.. (TBD)

Training a semantic segmentation with cross-entropy loss (log loss)

BBBC039: 200 images, 160 train + 40 validation, 256 x 256 random crop

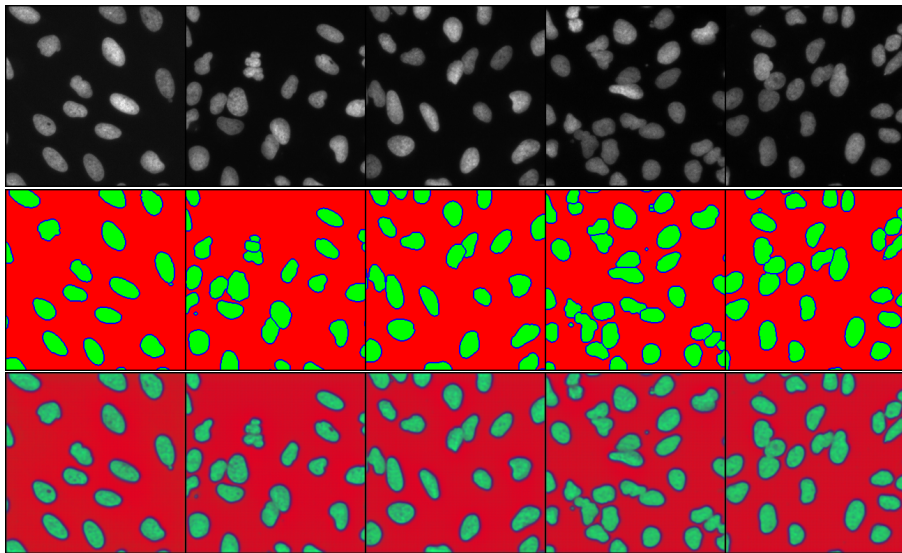


We train a 3-channel semantic segmentation model with **weighted** cross-entropy loss:

$$\mathcal{L} = \sum_{i,j} w_{ij} \log p_{ij}(\tilde{x}) = \sum_{i,j} w_{ij} \log \frac{\exp(-s_{ij}(\tilde{x}))}{\sum_{x \in \chi} \exp(-s_{ij}(\tilde{x}))}$$

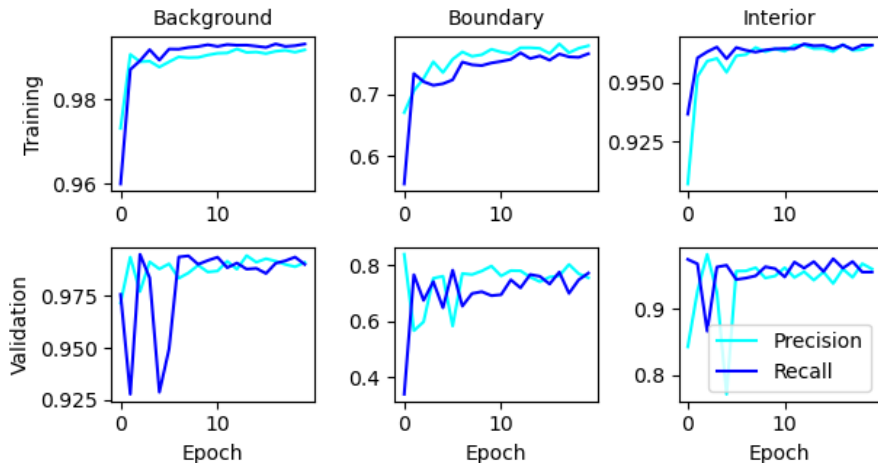
p_{ij} is the probability the model assigns a pixel to the true class $\tilde{x} \in \{a, b, c\}$

Training on BBBC039 U2OS Nuclei



Training on BBBC039 U2OS Nuclei

Learning rate $\eta = 0.01$, Batch-size $B = 5$ (32 train iterations, 8 validation)



Training on HeLa GAPDH channel

Cell segmentation using UNET implementation in PyTorch

Spot calling using Fisher information filter

Results

