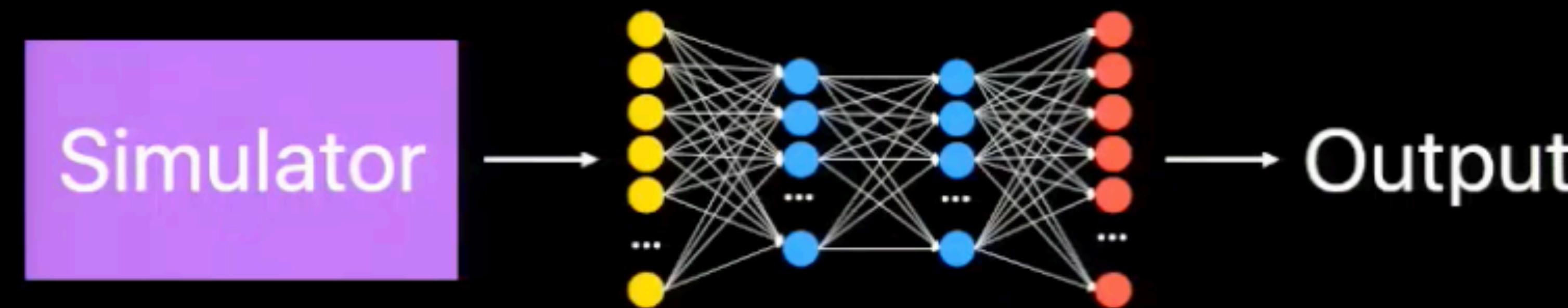


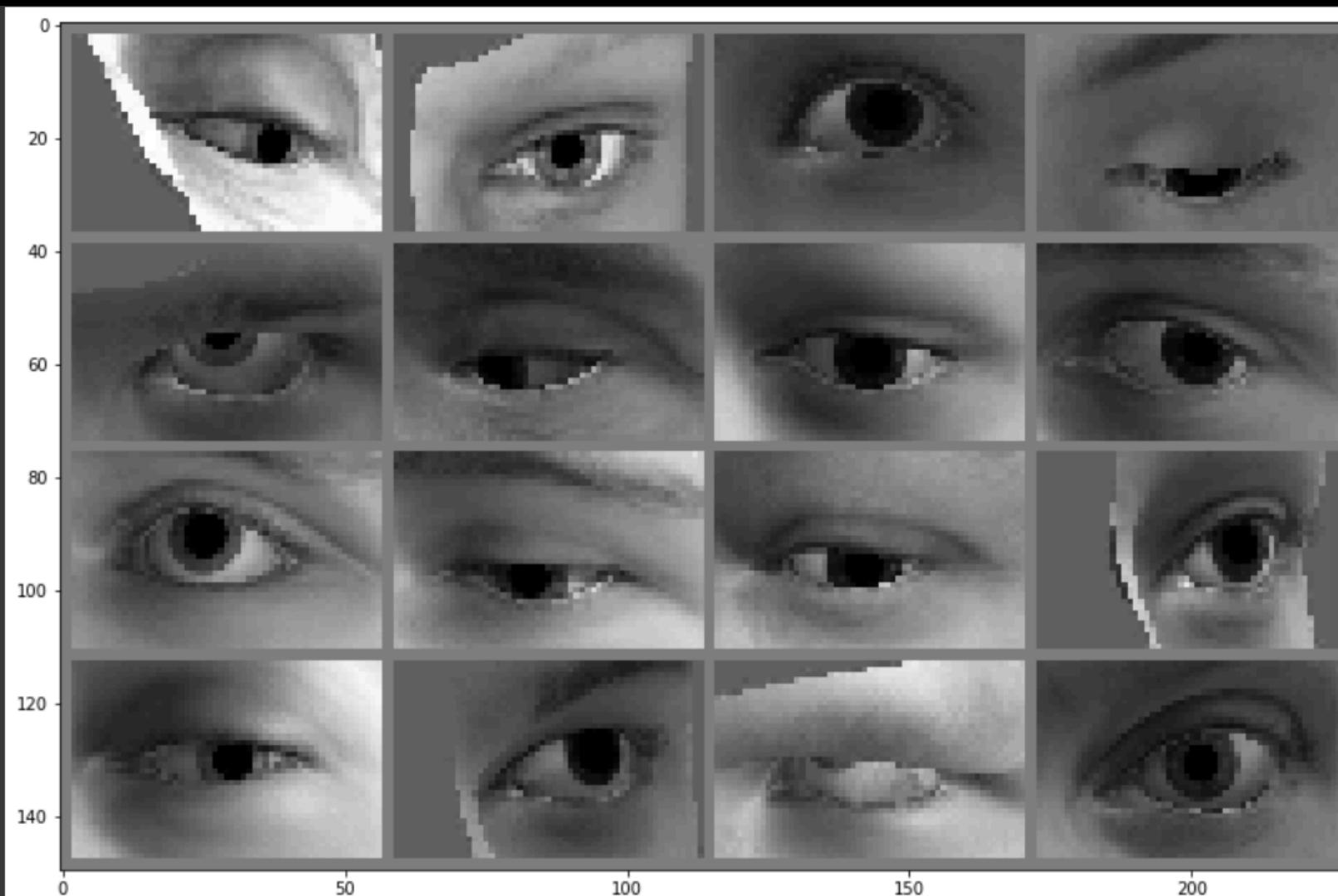
# **Increasing the realism of synthetic images from the simulator using unmarked real data**

**Vorobev Vadim**

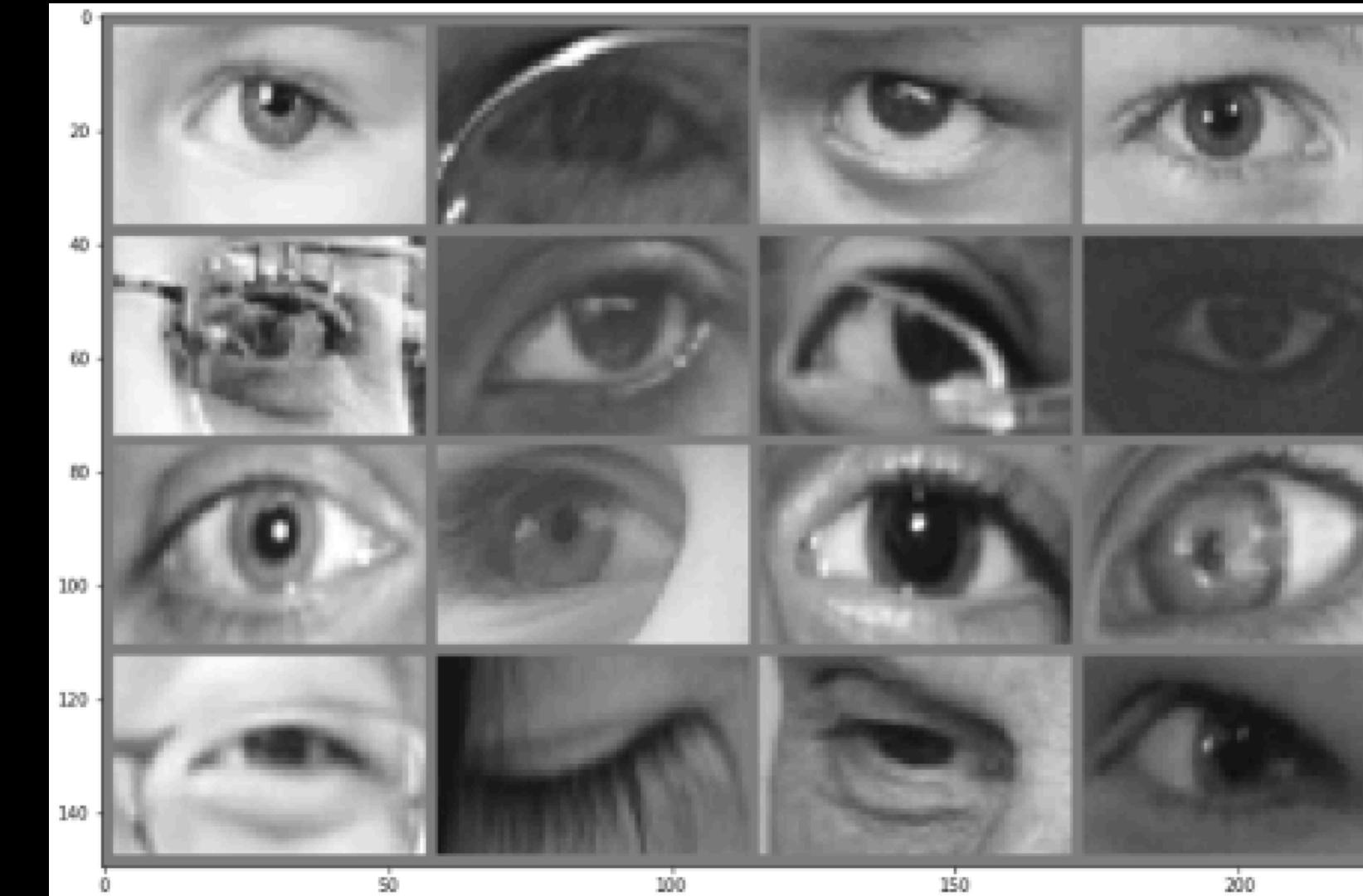
# Motivation using synthetic data



# Gap between real and synthetic images



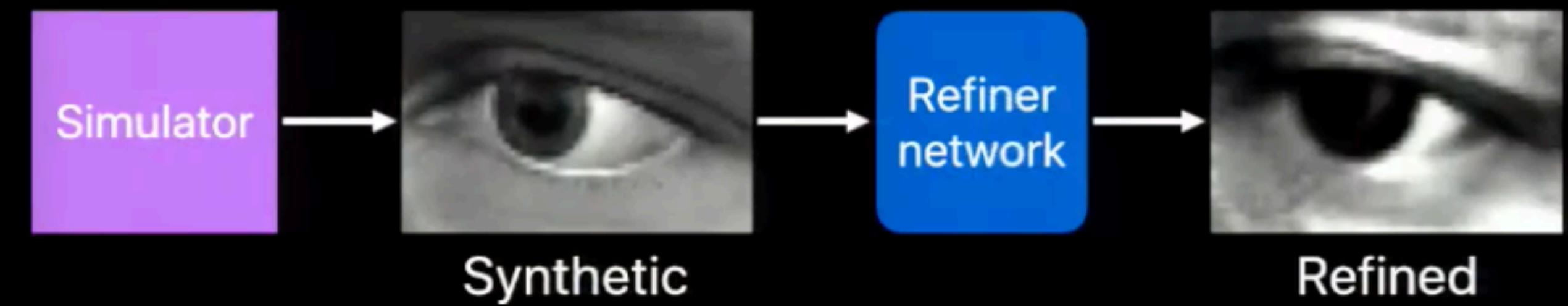
Synthetic images from Unity eye simulator



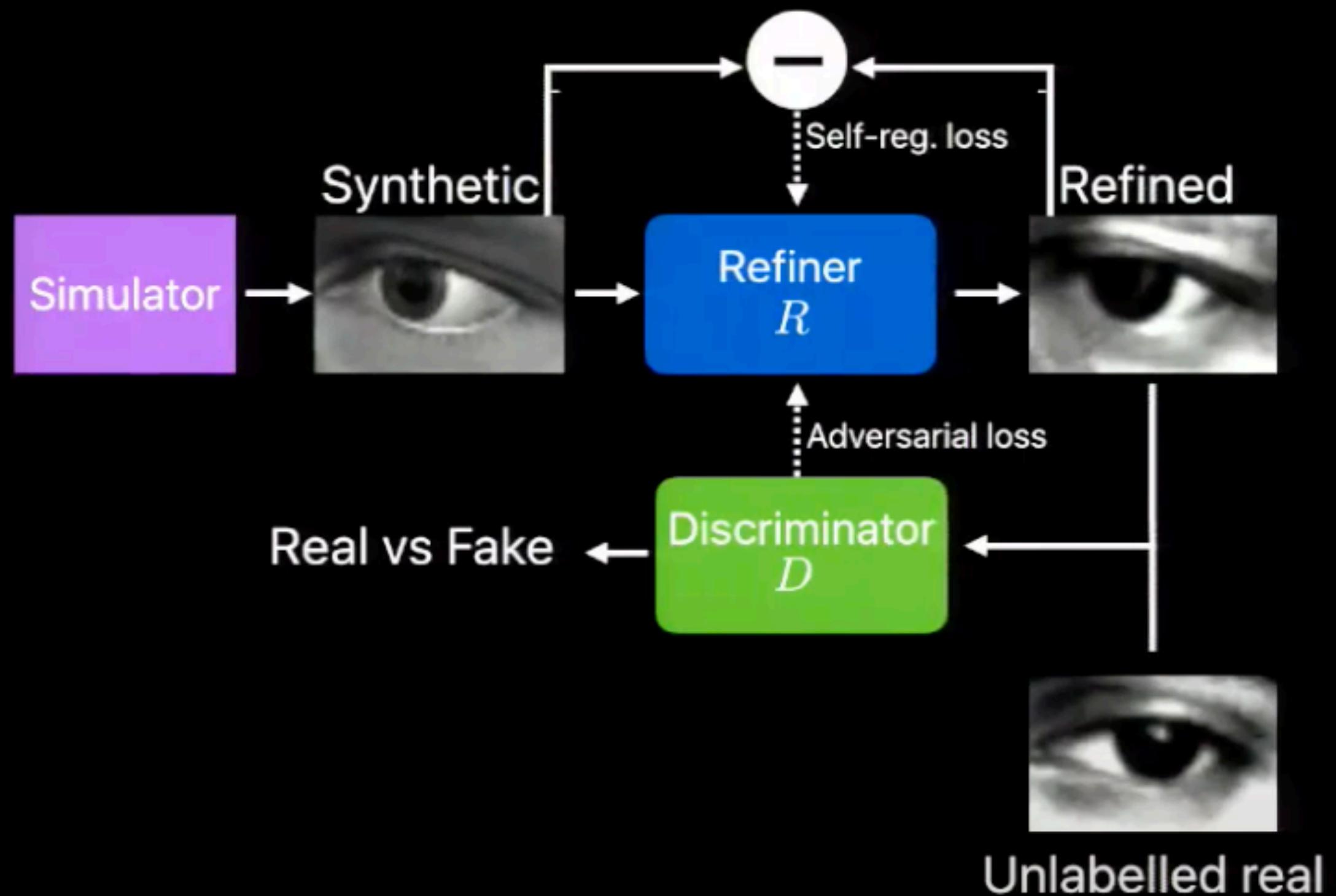
Real images

# Add realism to synthetic data

- Real and refined images should look similar
- No unrealistic artefacts in refined images



# Sim GAN overview



## Discriminator loss

$$\mathcal{L}_D^i(\phi) = -\log(1 - D(\mathbf{y}_i)) - \log(D(R(\mathbf{x}_i)))$$

Label 0 for real image      Label 1 for refined image

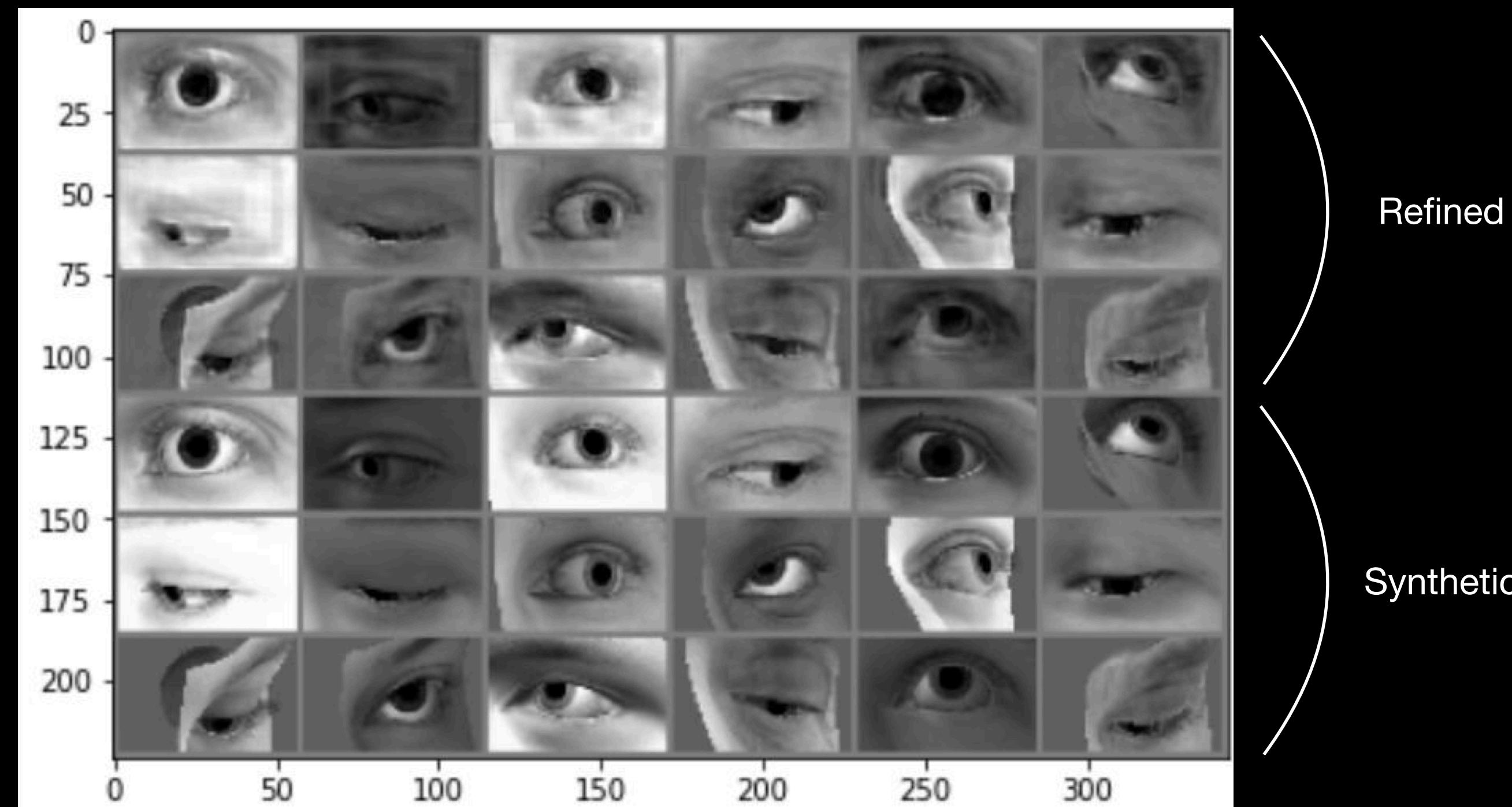
## Refiner loss

$$\mathcal{L}_R^i(\theta) = -\log(1 - D(R(\mathbf{x}_i))) + \lambda \|R(\mathbf{x}_i) - \mathbf{x}_i\|_1$$

Label 0 for refined image      Preserve annotation  
(Makes refined look real)

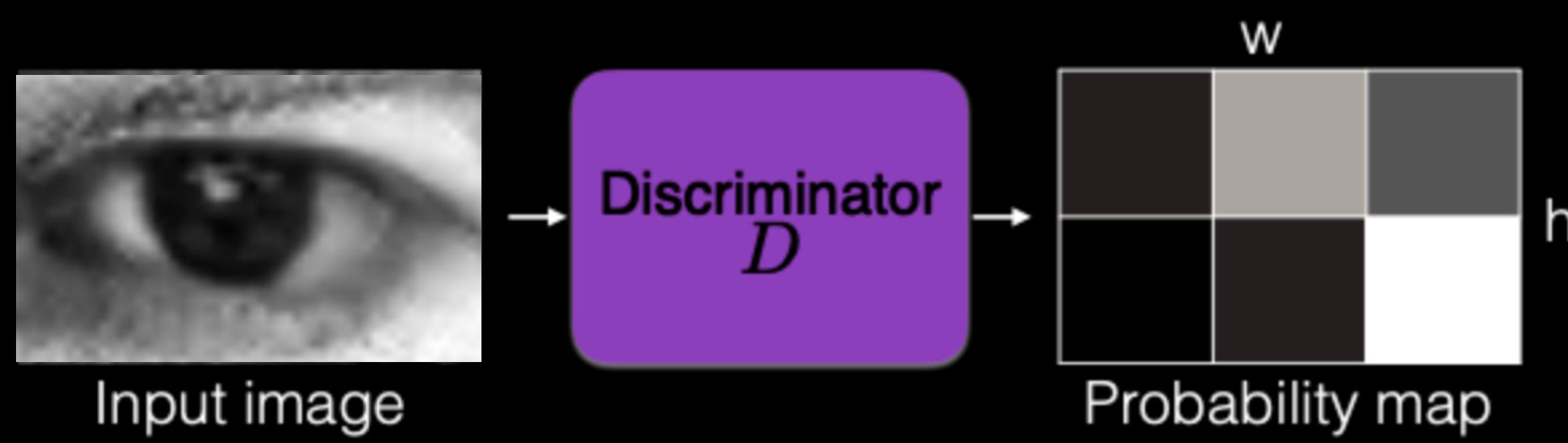
# About data and interim results

Synth data: Eye Gaze dataset  
Real data: Helen Eye Dataset

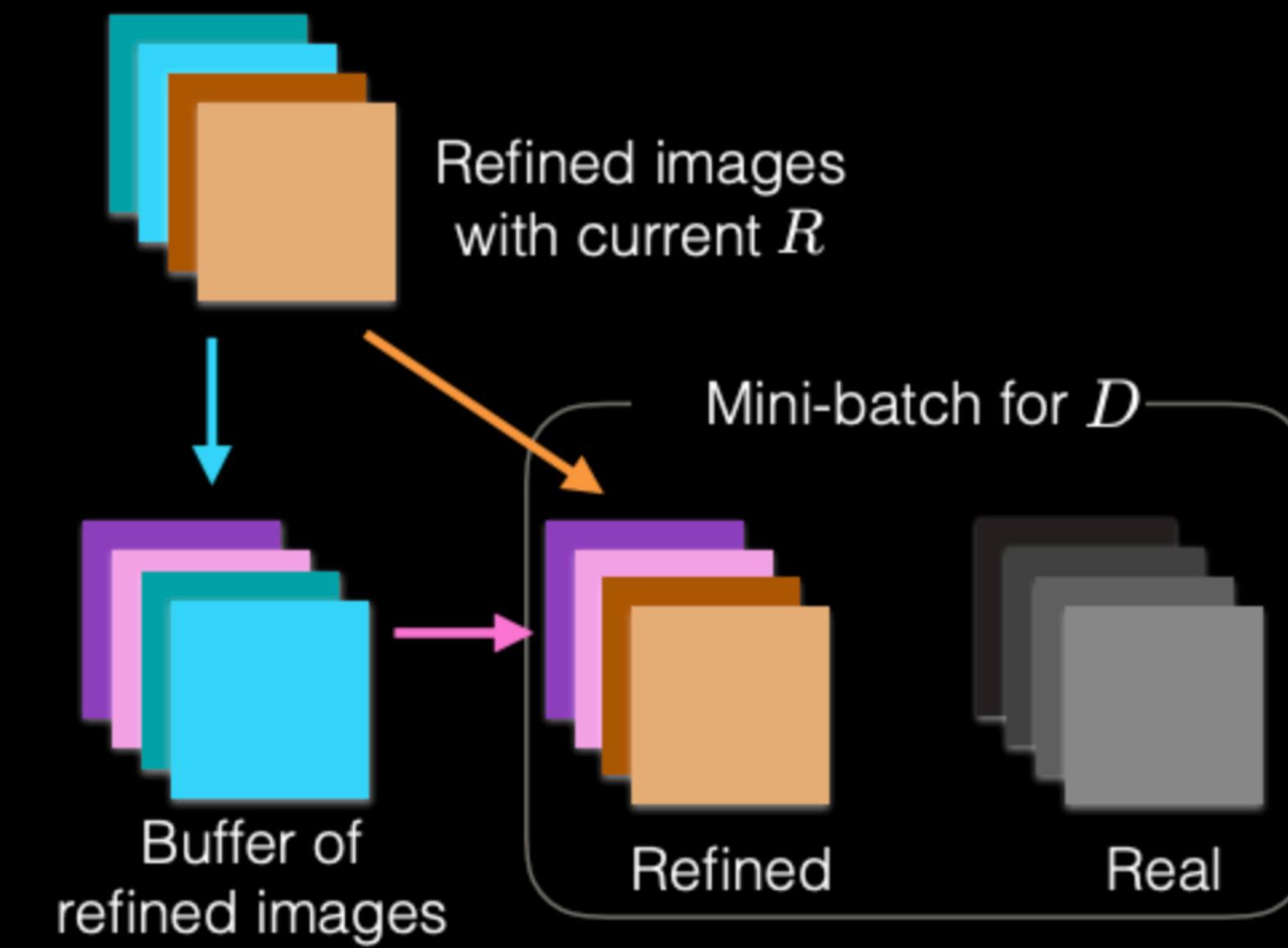


# Model improvements

Probability map

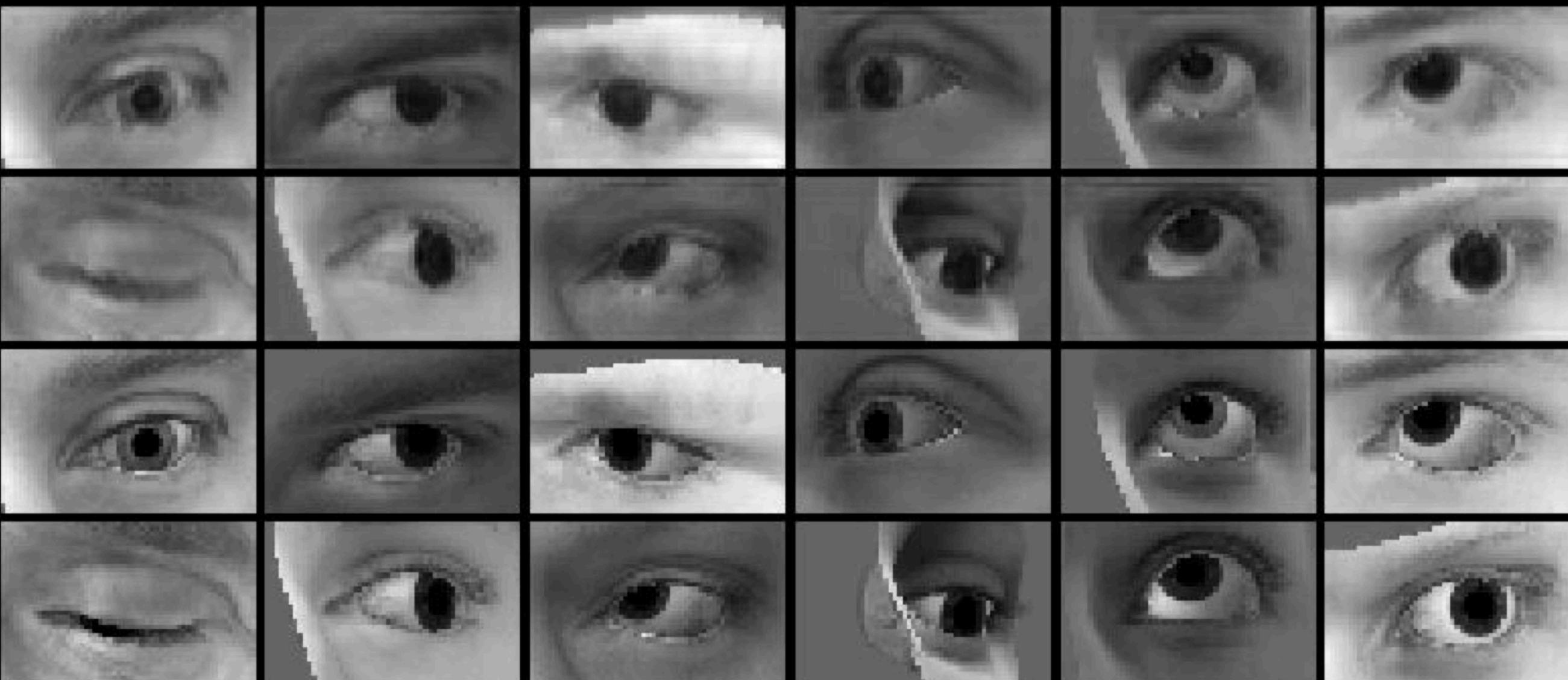


History of refined images

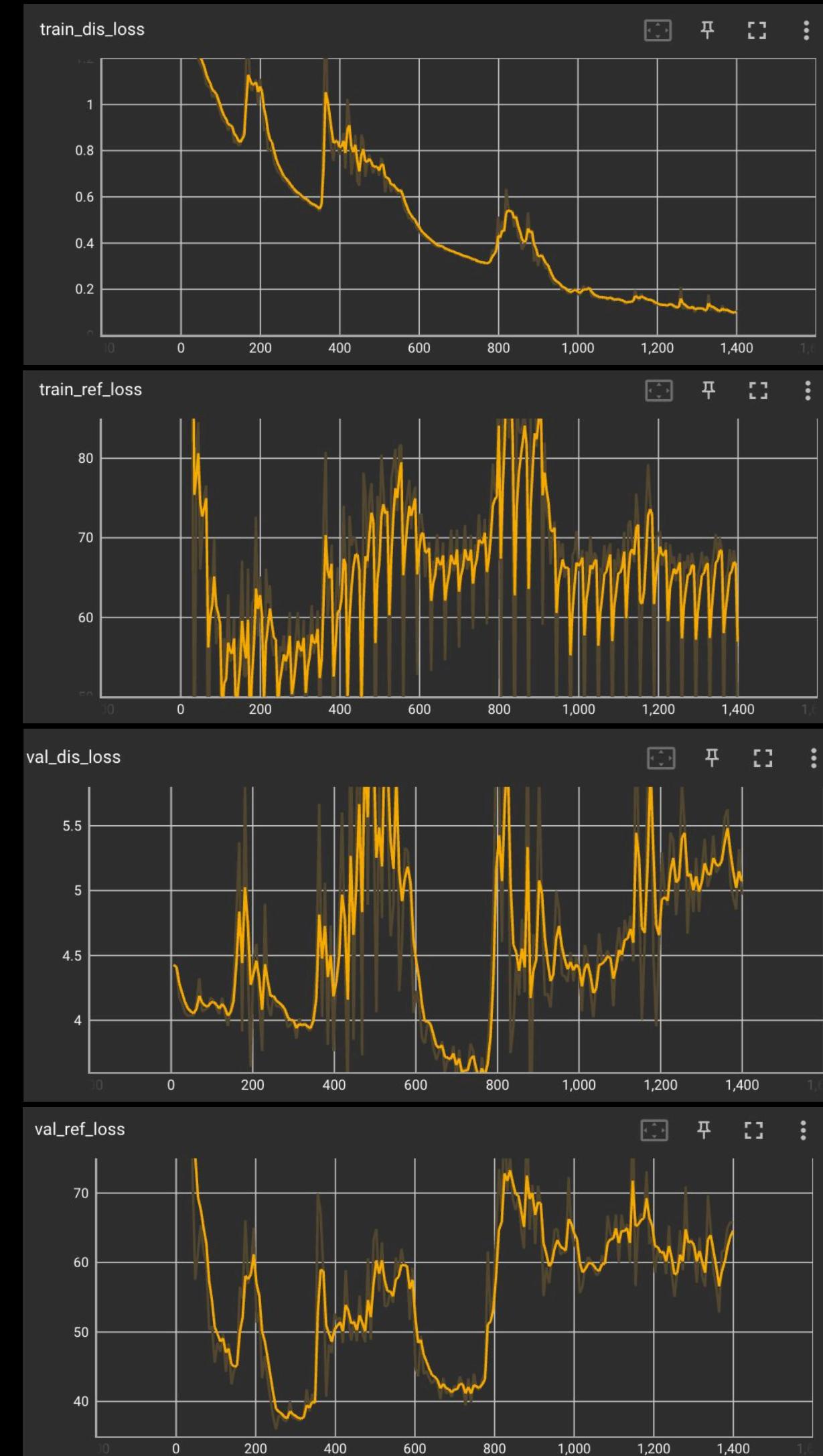


# Results using improvements

Refined



Synthetic



# Ideas for the future

- Try to use U-net as a discriminator
- Train on cleaner real data

**Thank you for your attention**