**Background**

OpenRTiST is a real-time style transfer application that takes image frames from the device and returns images that are stylized to resemble famous works of art which are then displayed on the user’s screen. Generative adversarial networks (GAN) are generative models: they create new data instances that resemble training data. GANs achieve this level of realism by pairing a generator, with a discriminator. The generator tries to fool the discriminator, and the discriminator tries to keep from being fooled. Our project creates new cognitive engines and then extends OpenRTiST to allow communications between different engines. We also trained a CUT model, and together with other pretrained models, we have added new styles from synthetic data.

**Understanding GANs**

![Diagram of GAN](image)

**Architecture**

Gabriel, a PaaS layer, handles the transmission of video frames from the client to the Coordinator Engine. The Coordinator Engine is responsible for managing an unified style list for the client and handing off the incoming images to the appropriate style transfer engine. This is achieved through the ZeroMQ client/server model, where the Coordinator Engine acts as a client, and each Style Transfer Engine acts as a server that returns transformed frames based on client’s request.

**CUT (Contrastive Unpaired Translation) GAN**

![Diagram of CUT GAN](image)

**Performance**

<table>
<thead>
<tr>
<th></th>
<th>Process Time</th>
<th># Parameters</th>
<th>FPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>OpenRTiST</td>
<td>0.034</td>
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<tr>
<td>CUTGAN</td>
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<tr>
<td>Remover</td>
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<td>112,546,959</td>
<td>~3</td>
</tr>
</tbody>
</table>

**Objects Remover**

![Diagram of Objects Remover](image)

References:
- OpenRTiST ([https://github.com/cmusatyalab/openrtist](https://github.com/cmusatyalab/openrtist))
- Gabriel ([https://github.com/cmusatyalab/gabriel](https://github.com/cmusatyalab/gabriel))
- Remover ([https://github.com/javirk/Person-remover-partial-convolutions](https://github.com/javirk/Person-remover-partial-convolutions))