The purpose of this lab is to explore the amazing developments that have happened in computer vision within the last 10 years. My goal is for this lab to be low stress and a celebration of what you have learned throughout this course.

To complete this lab, you must explore tasks that fit into the following categories:

* Tier 1 - Tasks that you can run using online demos and mobile apps. These should require no code, but simply using the provided interface. These should be easy to use and make it simple to obtain example outputs. Have fun making your own images and results!
* Tier 2 - Tasks that have pre-built models ready to go in PyTorch. You can grab a whole model and its pretrained weights with just one line of code in PyTorch. Use the provided links to find model descriptions and example scripts that show you how to use built-in PyTorch models (make sure to provide your own example image).
* Tier 3 - Tasks that you can find public code for through Github and other online services. These repos often require more specific setup, but once completed, they can also provide incredibly unique experiences. Read the installation instructions carefully when using external code repositories.

Here is a listing of possible tasks you can explore for each tier:

Tier 1 - Online and Mobile Implementations (You must complete **at least one** example from this section)

**Segmentation** - Possible explorations for this topic include:

* [Segment-AnythingLinks to an external site.](https://segment-anything.com/demo) - A website that can segment all the elements in a picture.

**Style Transfer**- Possible explorations for this topic include:

* [Arbitrary Style Transfer DemoLinks to an external site.](https://reiinakano.com/arbitrary-image-stylization-tfjs/)
* [Style Transfer Colab NotebookLinks to an external site.](https://colab.research.google.com/github/sayakpaul/Adventures-in-TensorFlow-Lite/blob/master/Style_Transfer_Demo_InceptionV3.ipynb)
* [Toonme.comLinks to an external site.](http://toonme.com/) - Focuses on cartoon stylizations
* [PrismaLinks to an external site.](https://play.google.com/store/apps/details?id=com.neuralprisma&hl=en_US&gl=US) - Style transfer mobile app
* [Style Transfer in PhotoshopLinks to an external site.](https://creativecloud.adobe.com/discover/article/how-to-transfer-styles-to-images-with-adobe-photoshop)

**Inpainting and Super Resolution** - Possible explorations for this topic include:

* [Nvidia Inpainting DemoLinks to an external site.](https://www.nvidia.com/research/inpainting/)
* [SWIN2SR Super Resolution Colab NotebookLinks to an external site.](https://github.com/NielsRogge/Transformers-Tutorials/blob/master/Swin2SR/Perform_image_super_resolution_with_Swin2SR.ipynb)

**Face Swapping and Deep Fakes** - Possible explorations for this topic include:

* [Lensa AILinks to an external site.](https://play.google.com/store/apps/details?id=com.lensa.app&hl=en&gl=US) - AI Reportraiting Tool
* [RefaceLinks to an external site.](https://play.google.com/store/apps/details?id=video.reface.app&hl=en_US&gl=US) - Face Swapping Image Mobile App

**Image Generation** - Possible explorations for this topic include:

* [ThisPersonDoesNotExist.comLinks to an external site.](https://thispersondoesnotexist.com/) - Human Face Generator
* [Bing Image CreatorLinks to an external site.](https://www.bing.com/images/create) - Generate images from text descriptions
* [Stable DiffusionLinks to an external site.](https://stablediffusionweb.com/#ai-image-generator) - Generate image from text descriptions

**Novel View Synthesis**- Possible explorations for this topic include:

* [Luma LabsLinks to an external site.](https://lumalabs.ai/) - Video to 3D scene creator

You may also use any other online demos that you can find that are related to computer vision tasks.

Tier 2 - PyTorch Built-in Implementations (You must complete **at least one**example from this section)

**Classification** - Possible explorations for this topic include:

* [Torchvision Pretrained ModelsLinks to an external site.](https://pytorch.org/vision/stable/models.html#classification)

**Segmentation** - Possible explorations for this topic include:

* [Torchvision Pretrained ModelsLinks to an external site.](https://pytorch.org/vision/stable/models.html#semantic-segmentation)

**Object Detection** - Possible explorations for this topic include:

* [Torchvision Pretrained ModelsLinks to an external site.](https://pytorch.org/vision/stable/models.html#object-detection)

**Human Keypoint Detection** - Possible explorations for this topic include:

* [Torchvision Pretrained ModelsLinks to an external site.](https://pytorch.org/vision/stable/models.html#keypoint-detection)

**Video Optical Flow**- Possible explorations for this topic include:

* [Torchvision Pretrained ModelsLinks to an external site.](https://pytorch.org/vision/stable/models.html#optical-flow)

**Depth Prediction**- Possible explorations for this topic include:

* [MIDASLinks to an external site.](https://pytorch.org/hub/intelisl_midas_v2/) - Single Image Depth Predictor ([Example Script](https://ecu.instructure.com/courses/118894/files/12651755?wrap=1)[Download Example Script](https://ecu.instructure.com/courses/118894/files/12651755/download?download_frd=1))

Tier 3 - PyTorch Github Implementations (You must complete **at least one** example from this section)

**Segmentation and Object Detection** - Possible explorations for this topic include:

* [Detectron 2Links to an external site.](https://github.com/facebookresearch/detectron2)
* [YOLOLinks to an external site.](https://github.com/ultralytics/ultralytics)
* [Segment-AnythingLinks to an external site.](https://segment-anything.com/demo)

**Style Transfer**- Possible explorations for this topic include:

* [Optimization-Based Style TransferLinks to an external site.](https://pytorch.org/tutorials/advanced/neural_style_tutorial.html)- Original Gatys implementation
* [Linear Style TransferLinks to an external site.](https://github.com/sunshineatnoon/LinearStyleTransfer) - Runs in older version of PyTorch ([Example Script](https://ecu.instructure.com/courses/118894/files/12652034?wrap=1)[Download Example Script](https://ecu.instructure.com/courses/118894/files/12652034/download?download_frd=1)that runs in current versions)
* [StyTR2Links to an external site.](https://github.com/diyiiyiii/StyTR-2)

**Face Swapping and Deep Fakes** - Possible explorations for this topic include:

* [Face FusionLinks to an external site.](https://github.com/facefusion/facefusion) - Face Swapping Interface
* [Deep Face LabsLinks to an external site.](https://github.com/iperov/DeepFaceLab) - Deep Fake video creator (Windows or Linux only)

**Inpainting and Super Resolution** - Possible explorations for this topic include:

* [SRGANLinks to an external site.](https://github.com/Lornatang/SRGAN-PyTorch)

**Human Pose Estimation** - Possible explorations for this topic include:

* [MMPoseLinks to an external site.](https://github.com/open-mmlab/mmpose)

**Novel View Synthesis**- Possible explorations for this topic include:

* [NeRFLinks to an external site.](https://github.com/bmild/nerf)
* [PlenoxelsLinks to an external site.](https://github.com/sxyu/svox2)
* [Gaussian SplattingLinks to an external site.](https://github.com/graphdeco-inria/gaussian-splatting)

You may also use any other Github repos that you can find that are related to computer vision tasks.

Ideally, with each example you choose, you should become familiar enough that you can generate an example output. However, please **do not spend more than 3 hours**on this. I want this to be a fun and exciting experience, rather than a focus on vague installation instructions. Explore what you can without getting distraught if you get stuck.

When you have completed at least one exploration in each tier, please submit a one-page document to Canvas containing:

* Example outputs/screenshots of each of the tasks you choose to complete
* Descriptions of what tasks you choose to complete
* What you learned from each task you completed
* What makes you most excited for the future of the computer vision