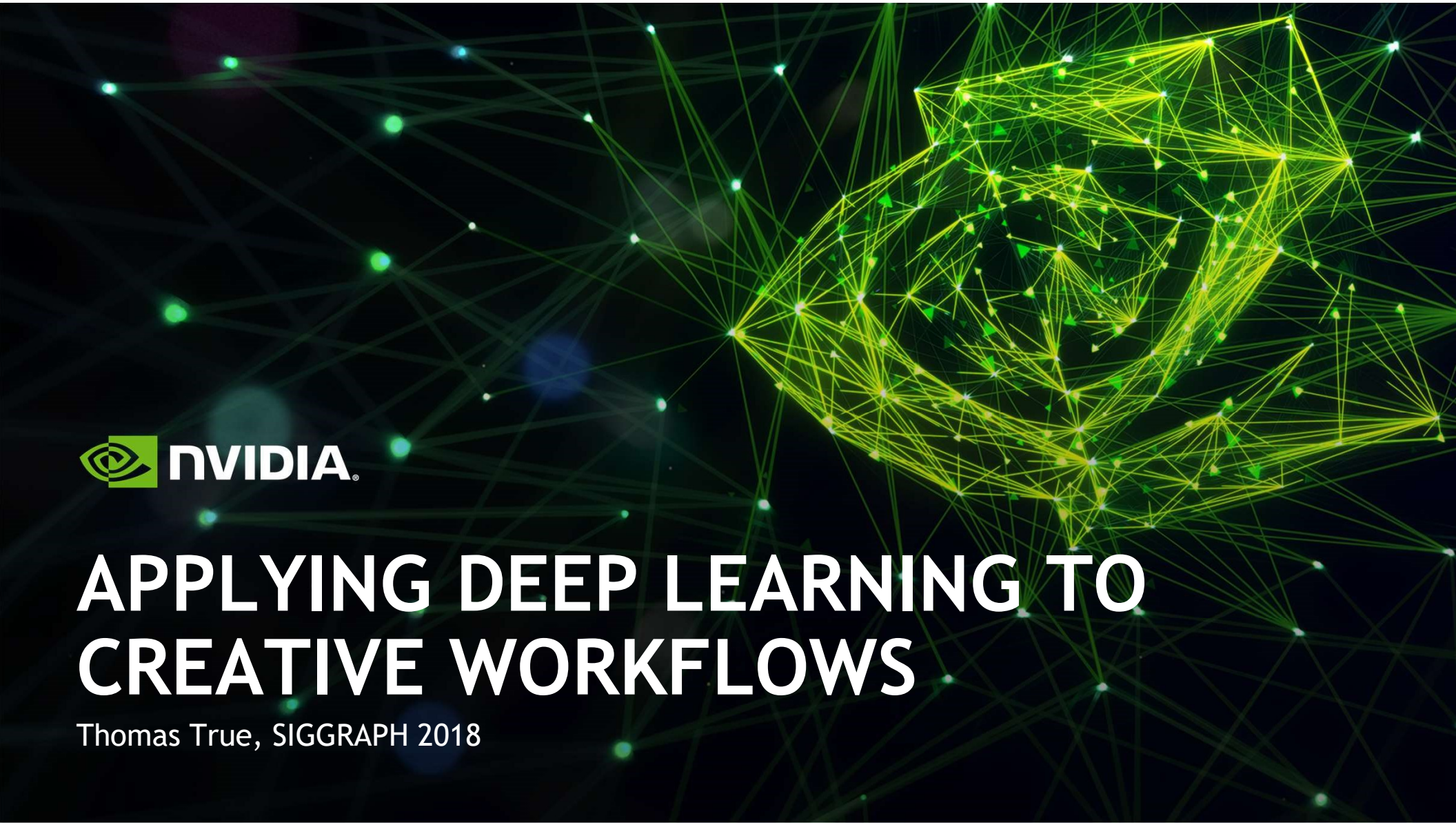


APPLYING DEEP LEARNING TO CREATIVE WORKFLOWS

Thomas True, SIGGRAPH 2018

WHAT IS DEEP LEARNING?

The differences between AI, ML & DL

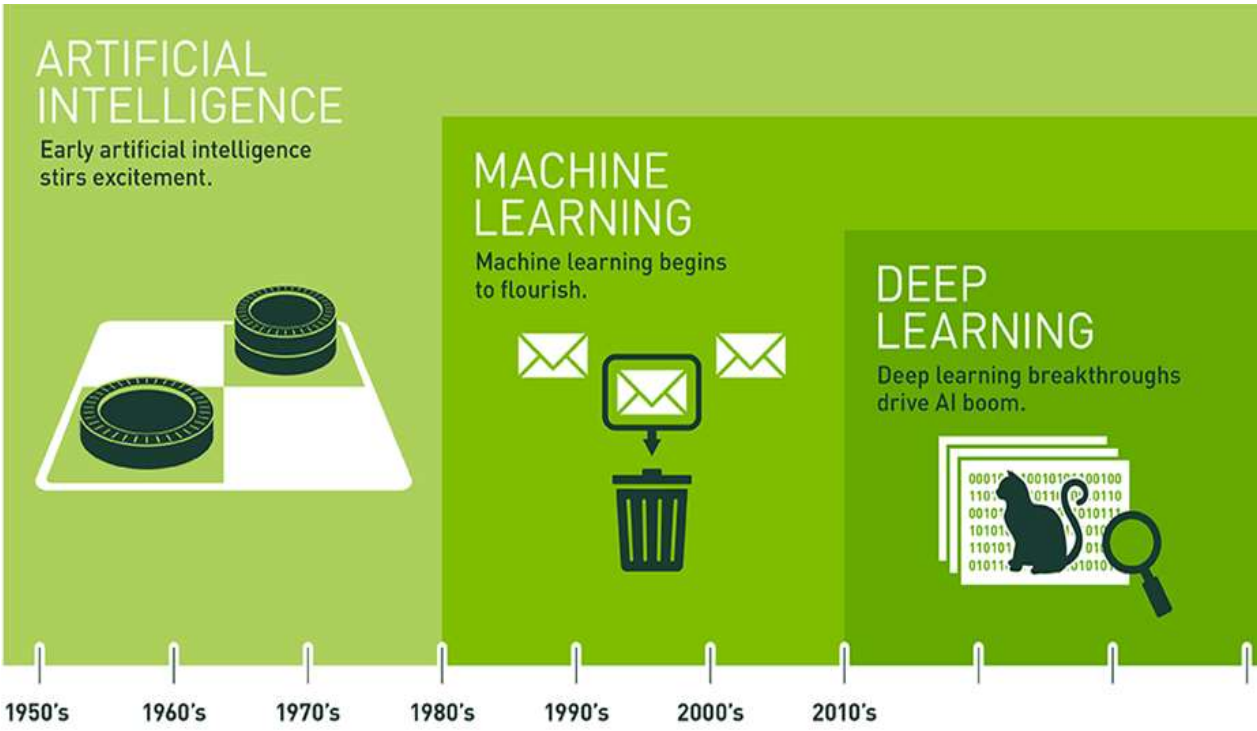
Artificial Intelligence (AI):
general coverall for machines doing interesting things

Machine Learning (ML):
computers complete tasks without explicit programming

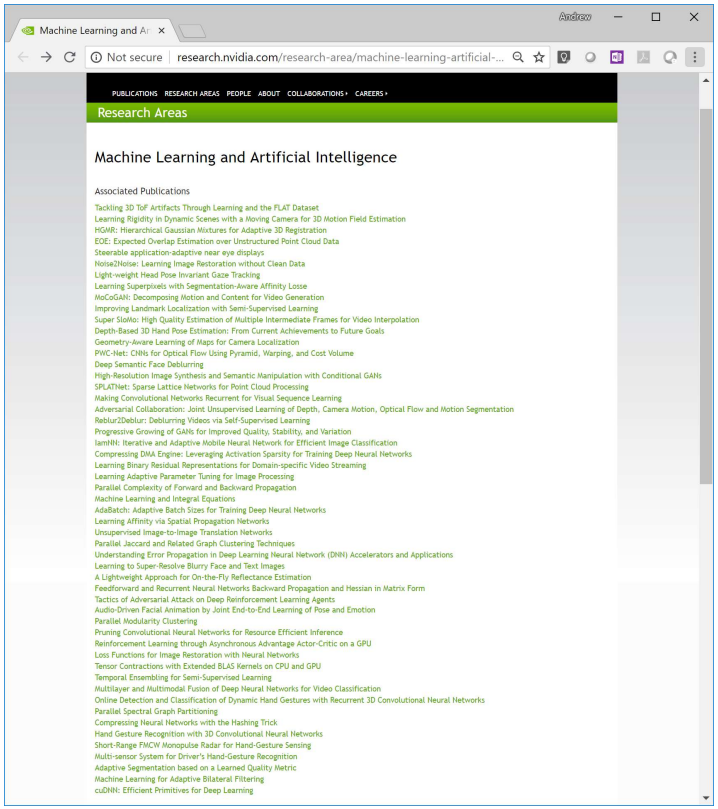
Neural Networks (NN):
one technique to achieve ML

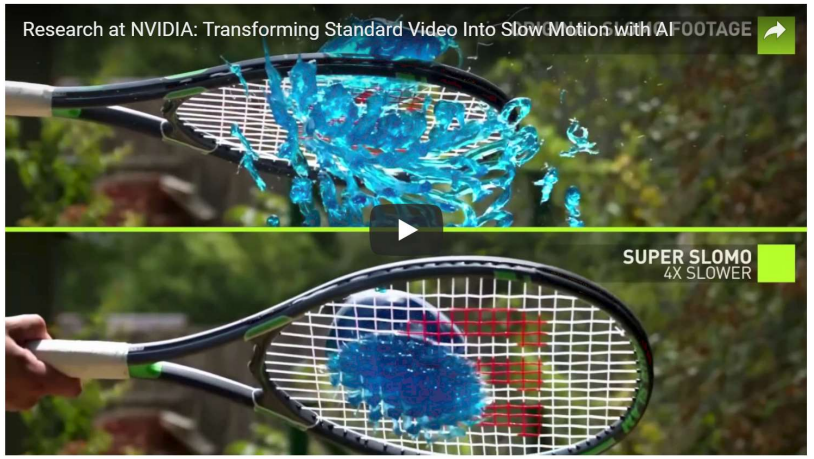
Deep Learning (DL):
adds “hidden layers” to Neural Networks to solve complex problems

Great explanation:
https://goo.gl/hkayWG

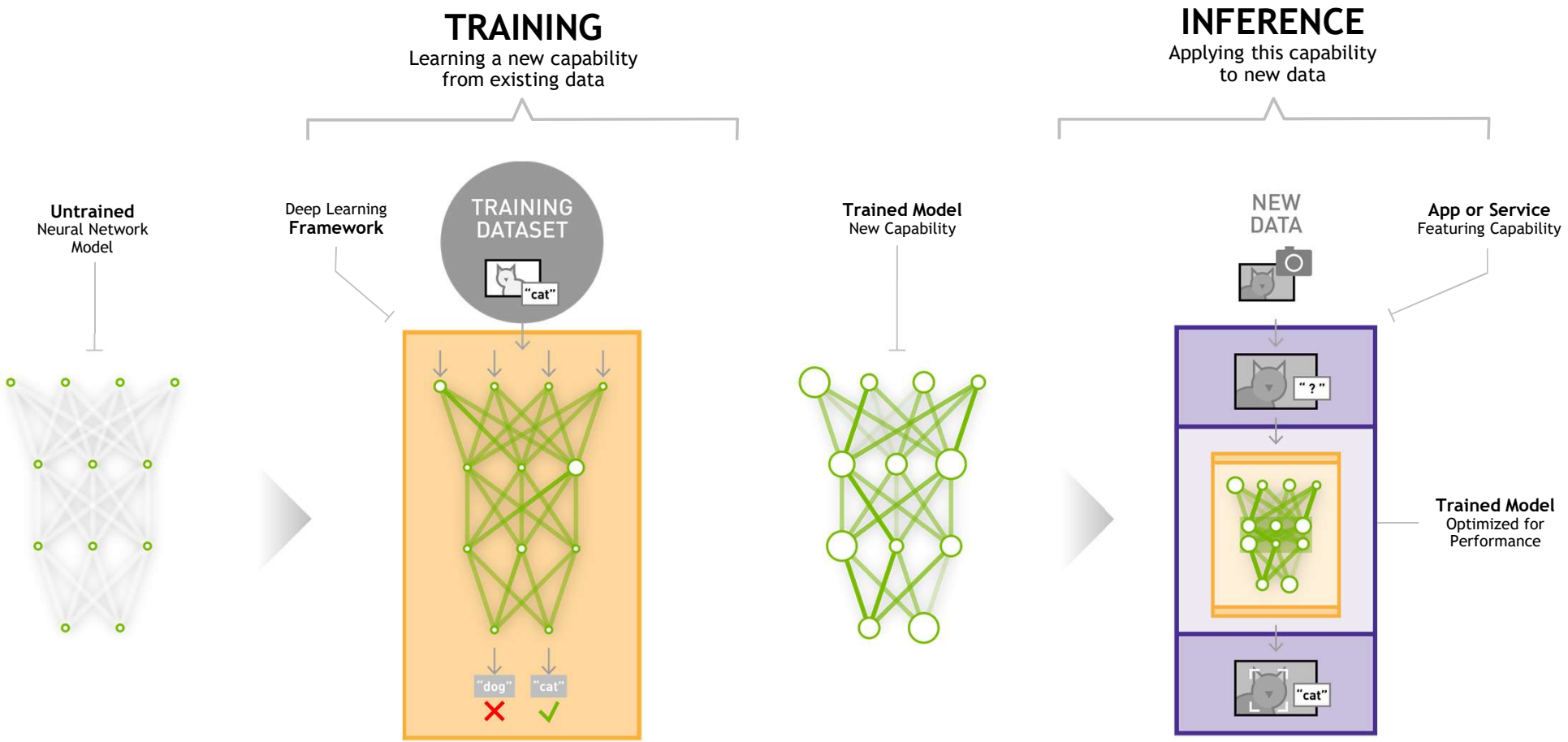


NVIDIA DL RESEARCH





DEEP LEARNING APPLICATION DEVELOPMENT



NVIDIA NGX: DL FOR CREATIVE APPLICATIONS

Delivering Deep Learning Research Into Creative Applications

- The framework to make **NV DL research available in end user applications** through a common service interface
- DL Features: **SloMo, Up-Res, InFilling, DLAA** …
  - Created, trained and updated by NVIDIA, will be available to any application running on an NGX GPU
- **NGX SDK** - ISVs can add these DL features to their application without going through the expense of developing and training



NVIDIA NGX: DL FOR CREATIVE APPLICATIONS

Delivering Deep Learning Research Into Creative Applications

3rd Party Integrations

ISV developed

Example Plugins

NVIDIA developed

NGX SDK

Windows 7 & 10
Service Style Interface
CUDA, D3D11 & 12

Driver/QXP

NGX Runtime
NGX Updater

AI Up-Res | AI Slo-Mo
AI InPainting | AI Anti-Aliasing

Quadro RTX

Tensor Cores

NVIDIA NGX: SDK

Delivering Deep Learning Research Into Creative Applications

```
// Initialize NGX.
NVSDK_NGX_CUDA_Init(NVNGX_VIDEO_SUPERRES_APP_ID, L"./", NVSDK_NGX_Version_API);
NVSDK_NGX_CUDA_GetParameters(&NGXparams);


// Create Feature
NVSDK_NGX_CUDA_CreateFeature(NVSDK_NGX_Feature_VideoSuperResolution,
                             NGXparams, &DUHandle);
```

AP [2]8

Slide 10

AP [2]8 Where do you get the list of available features>

Andrew Page, 8/14/2018

AP [2]17
AP [2]9

NVIDIA NGX: SDK

Delivering Deep Learning Research Into Creative Applications

```
// Set Parameters
NGXparams->Set("Width", inFrameWidth);
NGXparams->Set("Height", inFrameHeight);
NGXparams->Set("Scale", scale);
NGXparams->Set("Color.Format", NVSDK_NGX_Buffer_Format_RGBA32F);
NGXparams->Set("Color", inFrameData);
NGXparams->Set("Output.SizeInBytes", upscaledImageSize);
NGXparams->Set("Output.Format", NVSDK_NGX_Buffer_Format_RGBA32F);
NGXparams->Set("Output", outFrameData);

// Evaluate Feature
NVSDK_NGX_CUDA_EvaluateFeature(DUHandle, NGXparams, NGXTestCallback);
```

Slide 11

AP [2]7 How do you know what Params are valid for each sniipet?
Andrew Page, 8/14/2018

AP [2]9 Would it make sense to show one of these for Slo-Mo as well?
Andrew Page, 8/14/2018

NVIDIA NGX: SDK

Delivering Deep Learning Research Into Creative Applications

```
// Release Feature
NVSDK_NGX_CUDA_ReleaseFeature(DUHandle)

// Shutdown NGX
NVSDK_NGX_CUDA_Shutdown();
```

NVIDIA NGX: SDK

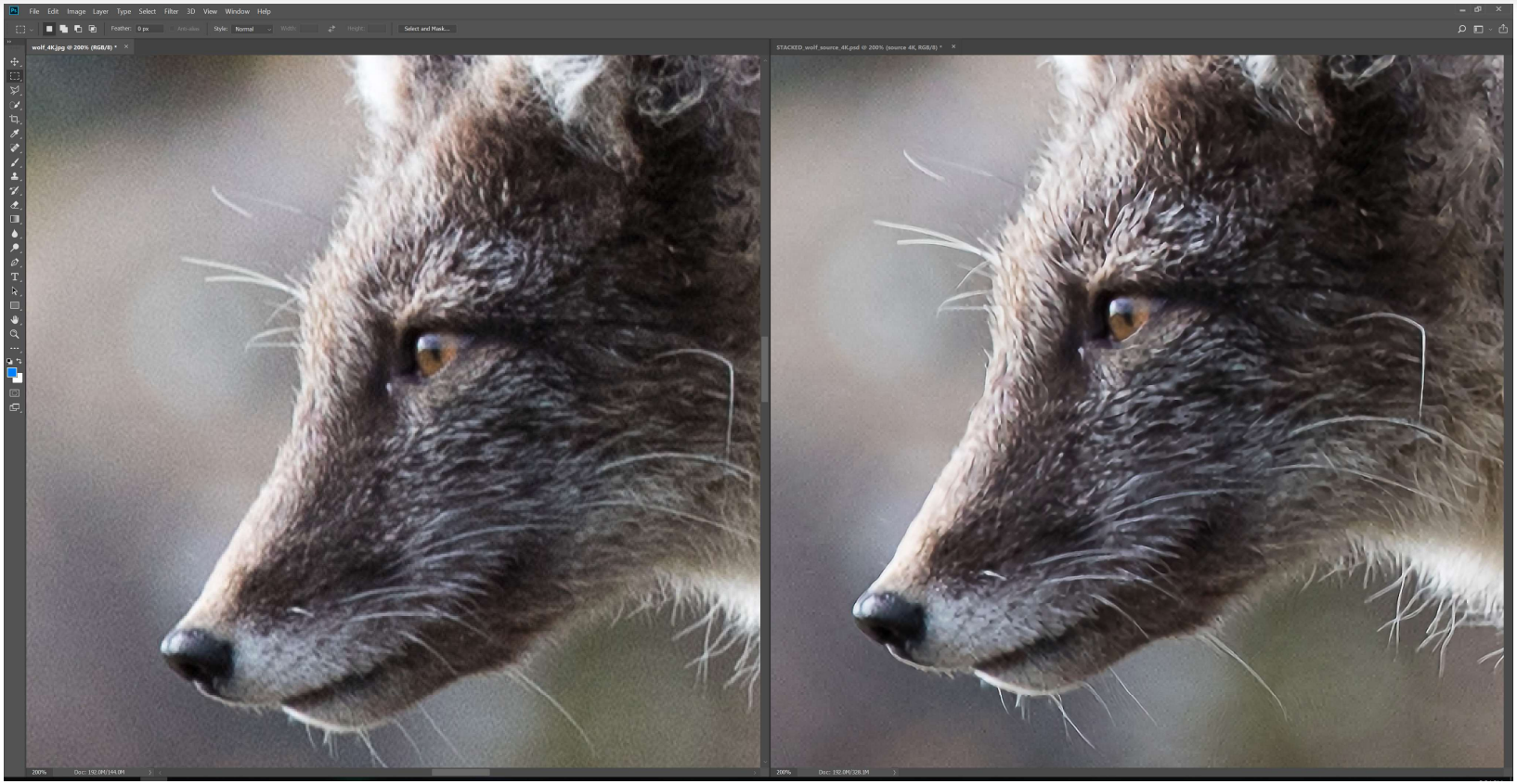
Delivering Deep Learning Research Into Creative Applications

NGX SDK

For developers that want to integrate into their own applications

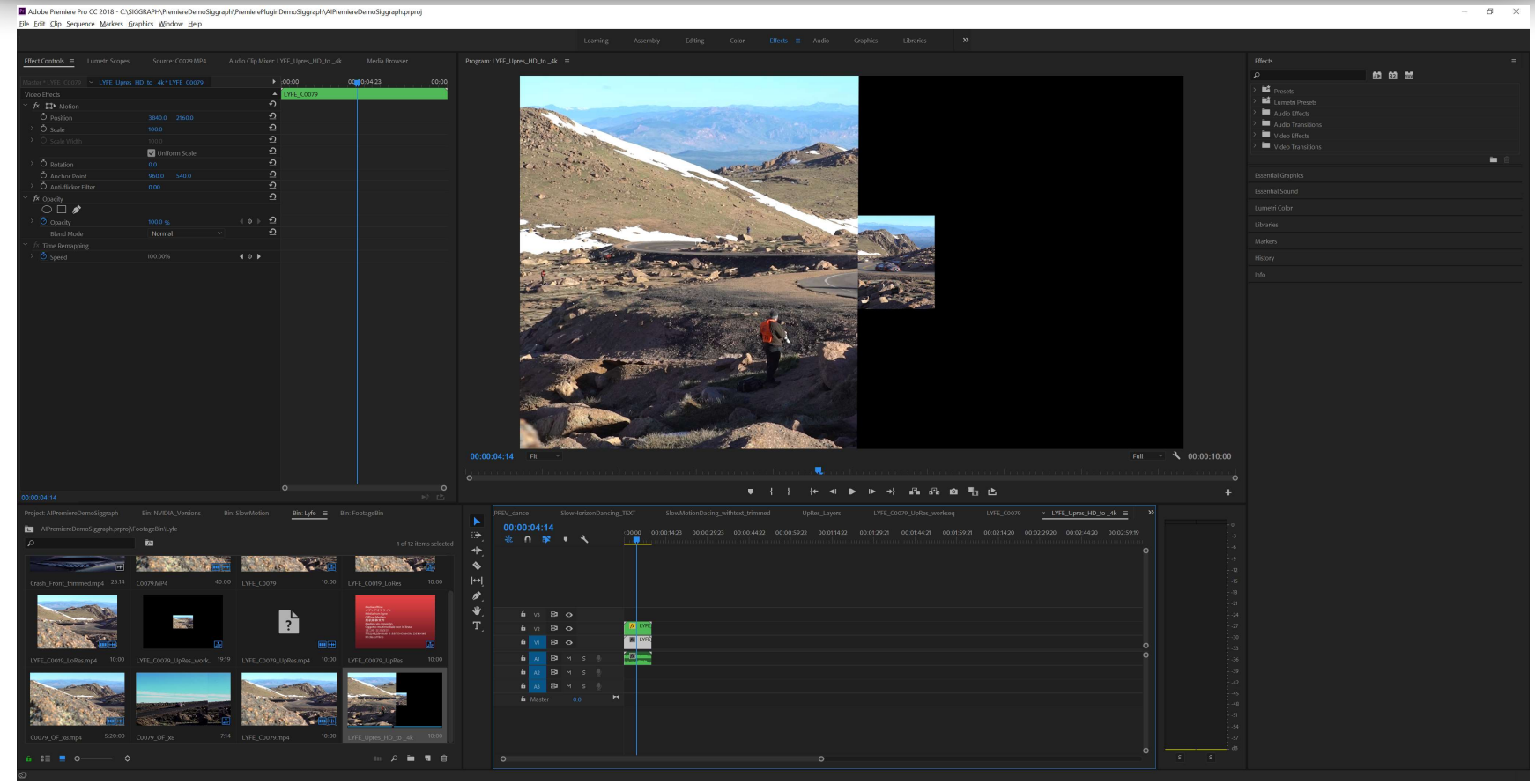
- Pre-trained NGX Neural Networks
- Simple integration with D3D and CUDA API
- Documentation and Samples
- Standardized NGX Features branding
- Regularly updated and improved networks delivered directly to end users

NVIDIA NGX: Image Uprez in Adobe Photoshop



NVIDIA NGX: Inpainting in Adobe Photoshop

NVIDIA NGX: Video Uprez in Adobe Premiere




NVIDIA