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

TRAINING
Learning a new capability from existing data

Untrained Neural Network Model
Deep Learning Framework

TRAINING DATASET

"dog"  "cat"

X  ✓

Trained Model
New Capability

INFERENCE
Applying this capability to new data

Trained Model
Optimized for Performance

App or Service Featuring Capability

NEW DATA

"cat"
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

<table>
<thead>
<tr>
<th>3rd Party Integrations</th>
<th>Example Plugins</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISV developed</td>
<td>NVIDIA developed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NGX SDK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 7 &amp; 10</td>
</tr>
<tr>
<td>Service Style Interface</td>
</tr>
<tr>
<td>CUDA, D3D11 &amp; 12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Driver/QXP</th>
<th>NGX Runtime</th>
<th>NGX Updater</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AI Up-Res</td>
<td>AI InPainting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AI Slo-Mo</td>
<td>AI Anti-Aliasing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quadro RTX</th>
<th>Tensor Cores</th>
</tr>
</thead>
</table>
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);
Where do you get the list of available features?
// 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);
How do you know what Params are valid for each snippet?
Andrew Page, 8/14/2018

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