



# Install deep learning libraries

ArcGIS Pro 2.8 | ArcGIS Image Server 10.9

Version 1.5 – June 2021

## Requirements

You must install deep learning frameworks packages and libraries to run the deep learning tools in ArcGIS. Before installing the frameworks, ensure ArcGIS Pro 2.8 is installed on your machine, or ensure you have set up and configured your [raster analytics deployment](#).

## Installation Instructions for ArcGIS Pro 2.8 using the Python Command Prompt

If you cannot use the [Deep Learning Frameworks Installer](#), you can follow the instructions below. Using the **Python Command Prompt**, you will first create a Python deep learning environment by cloning the default Python environment **arcgispro-py3**. While you can use any unique name for your cloned environment, the steps below use *deeplearning* as the cloned environment name.

Next, you will install the Python packages required for running deep learning tools. Keep in mind you will be installing specific versions of these packages indicated in the installation steps. The tools only work with these specific versions. Once the packages are installed, you will swap the Python environment.

**Note:** The deep learning packages cannot be installed using the **Python Package Manager**. You must install the packages through the command prompt. You must install all the packages listed below to run all the deep learning tools.

1. Open the **Python Command Prompt** window. You can search for this command prompt in the **Start** menu on Windows, or you can launch it from the ArcGIS Pro install folder. *If you are working in Windows 10, you must run the command prompt with administrator privileges.*

2. Type the following command to clone the Python environment:

```
conda create --name deeplearning --clone arcgispro-py3 --pinned
```

3. When the Python environment has been cloned, type the following command to activate the cloned environment:

```
activate deeplearning
```

When the cloned environment is activated, the new environment name appears at the beginning of the path, for example:

```
(deeplearning) C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3>
```

4. Type the following two commands to install the packages for ArcGIS Pro 2.8. If prompted to proceed, review the information, type **y**, and press **Enter**.

```
conda install -c esri arcgis=1.8.5 absl-py=0.12.0 ase=3.19.1
astor=0.8.1 beautifulsoup4=4.9.3 boost=1.73.0 cachetools=4.2.2
catalogue=1.0.0 cloudpickle=1.6.0 cudatoolkit=10.1.243 cudnn=7.6.5
cymem=2.0.5 cython=0.29.23 cython-blis=0.4.1 cytoolz=0.11.0 dask-
core=2021.5.0 deep-learning-essentials=2.8 fastai=1.0.60
fastprogress=0.2.3 fasttext=0.9.2 filelock=3.0.12 fsspec=0.9.0
gast=0.2.2 google-auth=1.21.3 google-auth-oauthlib=0.4.2 google-
pasta=0.2.0 googledrivedownloader=0.4 graphviz=2.38 grpcio=1.35.0
imageio=2.8.0 joblib=1.0.1 keepalive=0.5 keras-applications=1.0.8
keras-base=2.3.1 keras-gpu=2.3.1 keras-preprocessing=1.1.2 laspy=1.7.0
libboost=1.73.0 libopencv=4.5.0 libprotobuf=3.14.0 libwebp=1.2.0
llvmlite=0.36.0 markdown=3.3.4 murmurhash=1.0.5 ninja=1.10.2
numba=0.53.0 nvidia-ml-py3=7.352.0 onnx=1.7.0 onnx-tf=1.5.0
opencv=4.5.0 opt_einsum=3.3.0 partd=1.2.0 plac=1.1.0 plotly=4.5.4
pooch=1.0.0 preshed=3.0.2 protobuf=3.14.0 py-boost=1.73.0 py-
opencv=4.5.0 pyasn1=0.4.8 pyasn1-modules=0.2.8 pytorch=1.4.0
pywavelets=1.1.1 rdflib=5.0.0 retrying=1.3.3 rsa=4.7.2
sacremoses=0.0.43 scikit-image=0.17.2 scikit-learn=0.23.2
sentencepiece=0.1.91 soupsieve=2.2.1 spacy=2.2.4 sparqlwrapper=1.8.5
srsly=1.0.2 tensorboard=2.4.0 tensorboard-plugin-wit=1.6.0
tensorboardx=2.1 tensorflow=2.1.0 tensorflow-addons=0.9.1 tensorflow-
base=2.1.0 tensorflow-estimator=2.1.0 tensorflow-gpu=2.1.0
termcolor=1.1.0 thinc=7.4.0 threadpoolctl=2.1.0 tiff file=2020.10.1
tokenizers=0.8.1 toolz=0.11.1 torch-cluster=1.5.4 torch-geometric=1.5.0
torch-scatter=2.0.4 torch-sparse=0.6.1 torch-spline-conv=1.2.0
torchvision=0.5.0 tqdm=4.59.0 transformers=3.3.0 typeguard=2.7.0
wasabi=0.6.0 werkzeug=0.16.1 --no-deps
```

5. Type the following command to swap to the new environment:

```
proswap deeplearning
```

You can now use the Deep Learning tools in ArcGIS Pro 2.8.

## Installation Instructions for ArcGIS Image Server 10.9 in Windows Environment using the Command Prompt

If you cannot use the **Deep Learning Frameworks Installer**, follow the instructions below to install the deep learning Python packages in a Windows environment for ArcGIS Image Server 10.9. If you have a multinode ArcGIS Image Server site, repeat these steps on each server node.

Using the **Python 3 Command Prompt**, you will first create a Python deep learning environment by cloning the default Python environment **arcgispro-py3**. While you can use any unique name for your cloned environment, the steps below use *deeplearning* as the cloned environment name.

Next, you will install the Python packages required for running deep learning tools. Keep in mind you will be installing specific versions of these packages indicated in the installation steps. The tools only work with these specific versions. Once the packages are installed, you will swap the Python environment.

**Note:** The OS account you use for these steps must be the same as the account that was used when installing ArcGIS Image Server.

1. If you want to use GPUs for your deep learning raster analytics workflow, install the appropriate NVIDIA GPU drivers.
2. Open the **Python 3 Command Prompt**. You can search for this command prompt in the **Start** menu on Windows, or you can launch it from the ArcGIS Pro install folder
3. Type the following command to clone the Python environment:

```
conda create --name deeplearning --clone arcgispro-py3
```

When the Python environment has been cloned, type the following command to activate the cloned environment:

```
activate deeplearning
```

When the cloned environment is activated, the new environment name appears at the beginning of the path, for example:

```
(deeplearning) C:\Program  
Files\ArcGIS\Server\framework\runtime\ArcGIS\bin\Python\Scripts\
```

4. Type the following commands to install the deep learning packages. If prompted to proceed, review the information, type **y**, and press **Enter**.

```
conda install -c esri arcgis=1.8.3 absl-py=0.11.0 aiohttp=3.6.3  
ase=3.19.1 astor=0.8.1 async-timeout=3.0.1 beautifulsoup4=4.9.3  
cachetools=4.1.1 catalogue=1.0.0 cloudpickle=1.6.0 cudatoolkit=10.1.243  
cudnn=7.6.5 cymem=2.0.4 cython=0.29.21 cythonblis=0.4.1 cytoolz=0.11.0  
dask-core=2.30.0 deep-learning-essentials=2.7 fastai=1.0.60
```

```
fastprogress=0.2.3 fasttext=0.9.2 filelock=3.0.12 gast=0.2.2 google-
auth=1.23.0 google-auth-oauthlib=0.4.2 googlepasta=0.2.0
googledrivedownloader=0.4 graphviz=2.38 grpcio=1.31.0 imageio=2.8.0
isodate=0.6.0 joblib=0.17.0 keepalive=0.5 kerasapplications=1.0.8
keras-base=2.3.1 keras-gpu=2.3.1 keraspreprocessing=1.1.0 laspy=1.7.0
libopencv=4.5.0 libprotobuf=3.13.0.1 libwebp=1.1.0 llvmlite=0.34.0
markdown=3.3.3 multidict=4.7.6 murmurhash=1.0.2 ninja=1.10.1
numba=0.51.2 nvidia-ml-py3=7.352.0 onnx=1.7.0 onnx-tf=1.5.0
opencv=4.5.0 opt_einsum=3.1.0 plac=1.1.0 plotly=4.5.4 pooch=1.0.0
preshed=3.0.2 protobuf=3.13.0.1 pyopencv=4.5.0 pyasn1=0.4.8 pyasn1-
modules=0.2.8 pytorch=1.4.0 pywavelets=1.1.1 rdflib=5.0.0
retrying=1.3.3 rsa=4.6 sacremoses=0.0.43 scikit-image=0.17.2 scikit-
learn=0.23.2 sentencepiece=0.1.91 soupsieve=2.0.1 spacy=2.2.4
sparqlwrapper=1.8.5 srsly=1.0.2 tensorboard=2.3.0 tensorboard-plugin-
wit=1.6.0 tensorboardx=2.1 tensorflow=2.1.0 tensorflow-addons=0.9.1
tensorflow-base=2.1.0 tensorflow-estimator=2.1.0 tensorflow-gpu=2.1.0
termcolor=1.1.0 thinc=7.4.0 threadpoolctl=2.1.0 tiff file=2020.10.1
tokenizers=0.8.1 toolz=0.11.1 torch-cluster=1.5.4 torch-geometric=1.5.0
torchscatter=2.0.4 torch-sparse=0.6.1 torch-spline-conv=1.2.0
torchvision=0.5.0 tqdm=4.51.0 transformers=3.3.0 typeguard=2.7.0
wasabi=0.6.0 werkzeug=0.16.1 yarl=1.6.2 --no-deps
```

5. Type the following command to swap to the new environment:

```
proswap deeplearning
```

6. Repeat steps 1 through 5 on each machine in your ArcGIS Image Server site.
7. Restart each ArcGIS Image Server for Raster Analysis after the deep learning python packages are successfully installed.

You can now use the Deep Learning tools in your ArcGIS Image Server 10.9 Windows Environment.

## Installation Instructions for ArcGIS Image Server 10.9 in Linux Environment using the Command Prompt

If you cannot use the **Deep Learning Frameworks Installer**, follow the instructions below to install the deep learning Python packages in a Linux environment for ArcGIS Image Server 10.9. If you have a multinode ArcGIS Image Server site, repeat these steps on each server node.

Using the terminal, you will first create a Python deep learning environment by cloning the default Python environment **arcgispro-py3**. While you can use any unique name for your cloned environment, the steps below use *deeplearning* as the cloned environment name.

Next, you will install the Python packages required for running deep learning tools. Keep in mind you will be installing specific versions of these packages indicated in the installation steps. The tools only work

with these specific versions. Once the packages are installed, you will swap the Python environment.

**Note:** The OS account you use for these steps must be the same as the [service account](#) for ArcGIS Image Server.

1. If you want to use GPUs for your deep learning raster analytics workflow, install the appropriate NVIDIA GPU drivers.
2. Open a terminal as the user who installed ArcGIS Image Server.
3. Type the following four commands to clone the Python environment and activate the clone:

```
source /<ArcGIS install directory>/server/framework/etc/arcenv
unset LD_PRELOAD

wine cmd /c "C:/Program
Files/arcgis/server/framework/runtime/ArcGIS/bin/Python/Scripts/conda.e
xe" create --name deeplearning --clone arcgispro-py3

wine cmd /c "C:/Program
Files/arcgis/server/framework/runtime/ArcGIS/bin/Python/Scripts/conda.e
xe" proswap -n deeplearning
```

4. Type the following three commands to install the deep learning packages.

```
wine cmd /c "C:/Program
Files/arcgis/server/framework/runtime/ArcGIS/bin/Python/Scripts/conda.e
xe" proswap -n deeplearning
```

```
wine cmd /c "C:/Program
Files/arcgis/server/framework/runtime/ArcGIS/bin/Python/Scripts/conda.e
xe" install -c esri arcgis=1.8.3 absl-py=0.11.0 aiohttp=3.6.3
ase=3.19.1 astor=0.8.1 async-timeout=3.0.1 beautifulsoup4=4.9.3
cachetools=4.1.1 catalogue=1.0.0 cloudpickle=1.6.0 cudatoolkit=10.1.243
cudnn=7.6.5 cymem=2.0.4 cython=0.29.21 cythonblis=0.4.1 cytoolz=0.11.0
dask-core=2.30.0 deep-learning-essentials=2.7 fastai=1.0.60
fastprogress=0.2.3 fasttext=0.9.2 filelock=3.0.12 gast=0.2.2 google-
auth=1.23.0 google-auth-oauthlib=0.4.2 googlepasta=0.2.0
googledrivedownloader=0.4 graphviz=2.38 grpcio=1.31.0 imageio=2.8.0
isodate=0.6.0 joblib=0.17.0 keepalive=0.5 kerasapplications=1.0.8
keras-base=2.3.1 keras-gpu=2.3.1 keraspreprocessing=1.1.0 laspy=1.7.0
libopencv=4.5.0 libprotobuf=3.13.0.1 libwebp=1.1.0 llvmlite=0.34.0
markdown=3.3.3 multidict=4.7.6 murmurhash=1.0.2 ninja=1.10.1
numba=0.51.2 nvidia-ml-py3=7.352.0 onnx=1.7.0 onnx-tf=1.5.0
opencv=4.5.0 opt_einsum=3.1.0 plac=1.1.0 plotly=4.5.4 pooch=1.0.0
preshed=3.0.2 protobuf=3.13.0.1 pyopencv=4.5.0 pyasn1=0.4.8 pyasn1-
modules=0.2.8 pytorch=1.4.0 pywavelets=1.1.1 rdflib=5.0.0
retrying=1.3.3 rsa=4.6 sacremoses=0.0.43 scikit-image=0.17.2 scikit-
learn=0.23.2 sentencepiece=0.1.91 soupsieve=2.0.1 spacy=2.2.4
sparqlwrapper=1.8.5 srsly=1.0.2 tensorboard=2.3.0 tensorboard-plugin-
```

```
wit=1.6.0 tensorboardx=2.1 tensorflow=2.1.0 tensorflow-addons=0.9.1  
tensorflow-base=2.1.0 tensorflow-estimator=2.1.0 tensorflow-gpu=2.1.0  
termcolor=1.1.0 thinc=7.4.0 threadpoolctl=2.1.0 tifffile=2020.10.1  
tokenizers=0.8.1 toolz=0.11.1 torch-cluster=1.5.4 torch-geometric=1.5.0  
torchscatter=2.0.4 torch-sparse=0.6.1 torch-spline-conv=1.2.0  
torchvision=0.5.0 tqdm=4.51.0 transformers=3.3.0 typeguard=2.7.0  
wasabi=0.6.0 werkzeug=0.16.1 yarl=1.6.2 --no-deps
```

5. Repeat steps 1 through 4 on each machine in your ArcGIS Image Server site.
6. Restart each ArcGIS Image Server for Raster Analysis after the deep learning python packages are successfully installed.

You can now use the Deep Learning tools in your ArcGIS Image Server 10.9 Linux Environment.