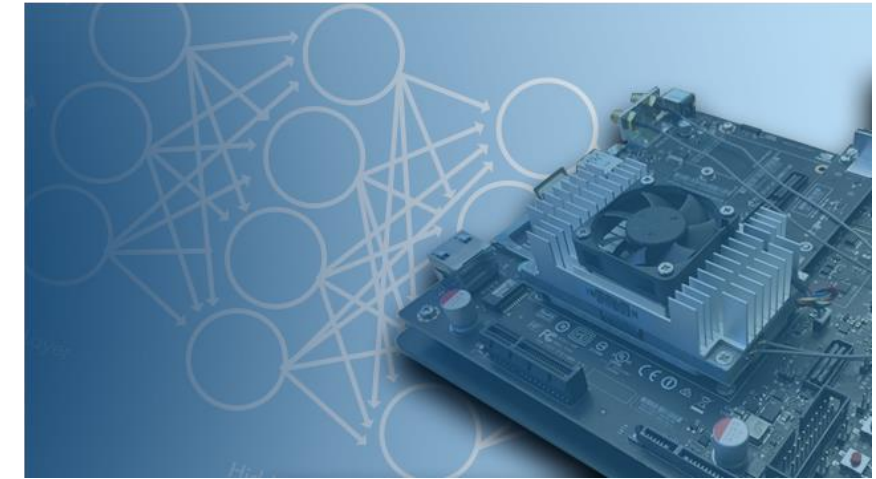
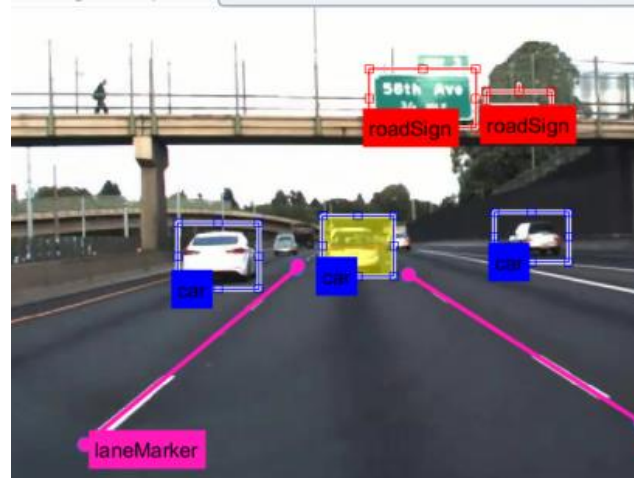
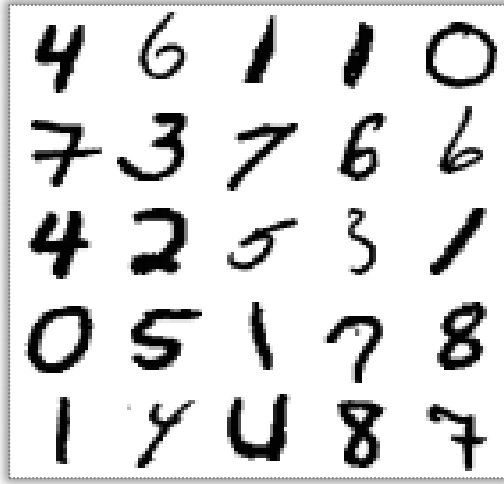
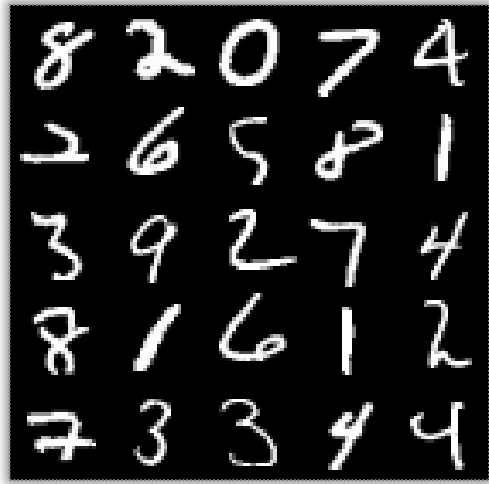


MATLAB深度学习



What is Deep Learning?



12 40.0%	0 0.0%	100% 0.0%
0 0.0%	18 60.0%	100% 0.0%
100% 0.0%	100% 0.0%	100% 0.0%

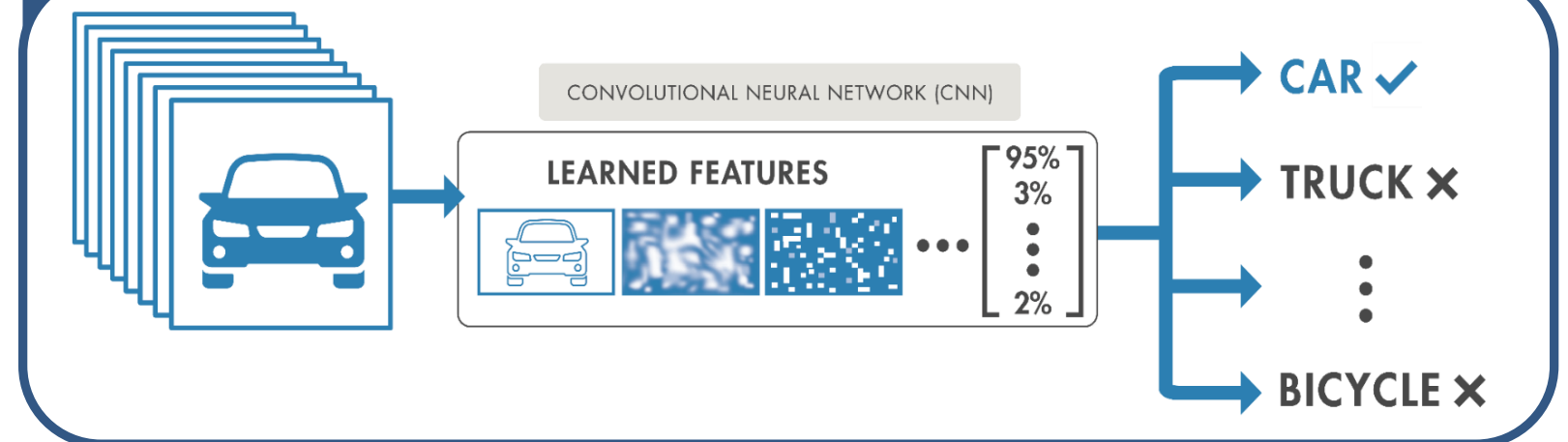
深度学习

- 深度学习是一种机器学习，可以直接从原始的图像，文本或声音数据进行模型的训练。
- 深度学习实现了自动特征选取；
- 深度学习通常都是通过神经网络实现，其**深度**是指神经网络结构的**层数**

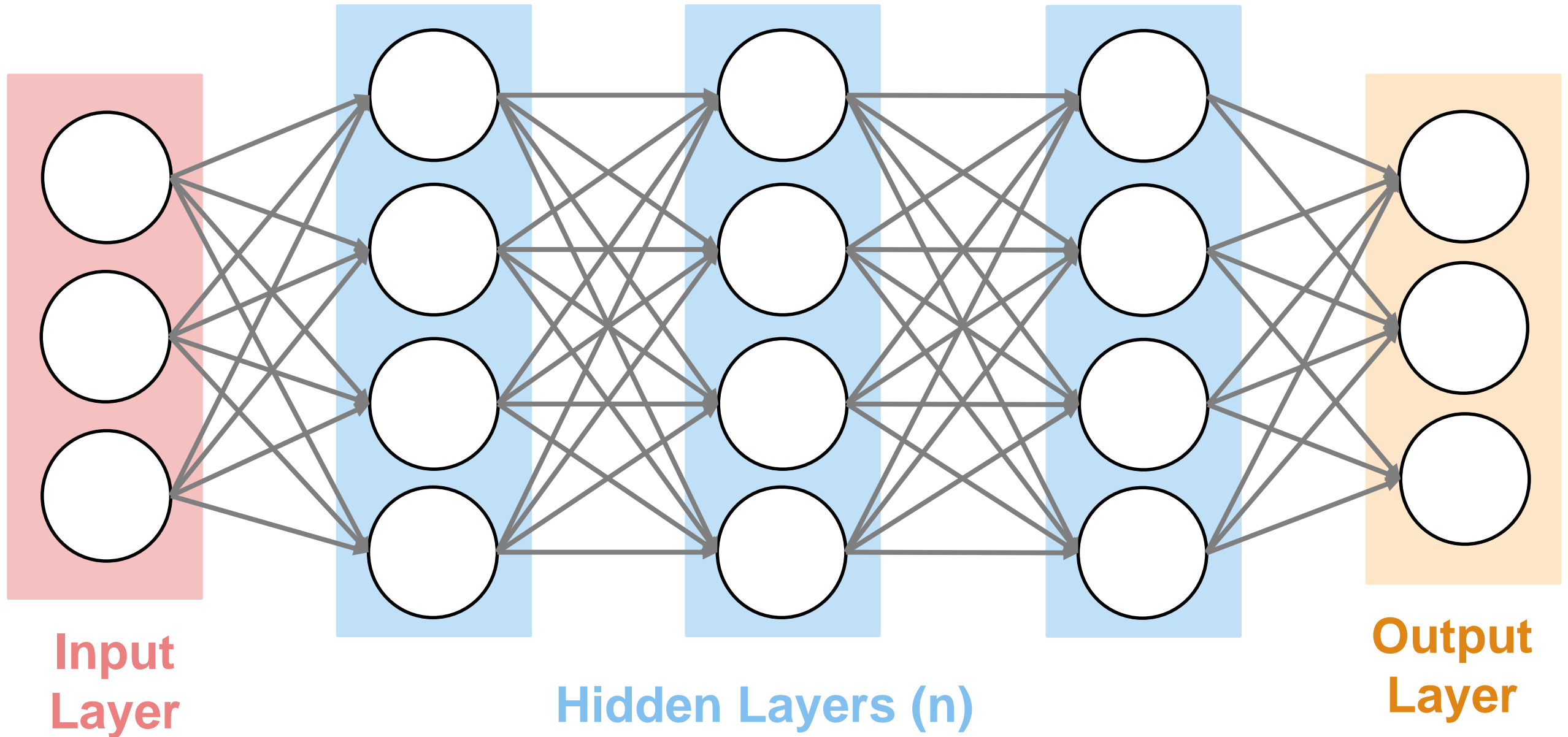
Machine
Learning

Deep
Learning

Deep Learning



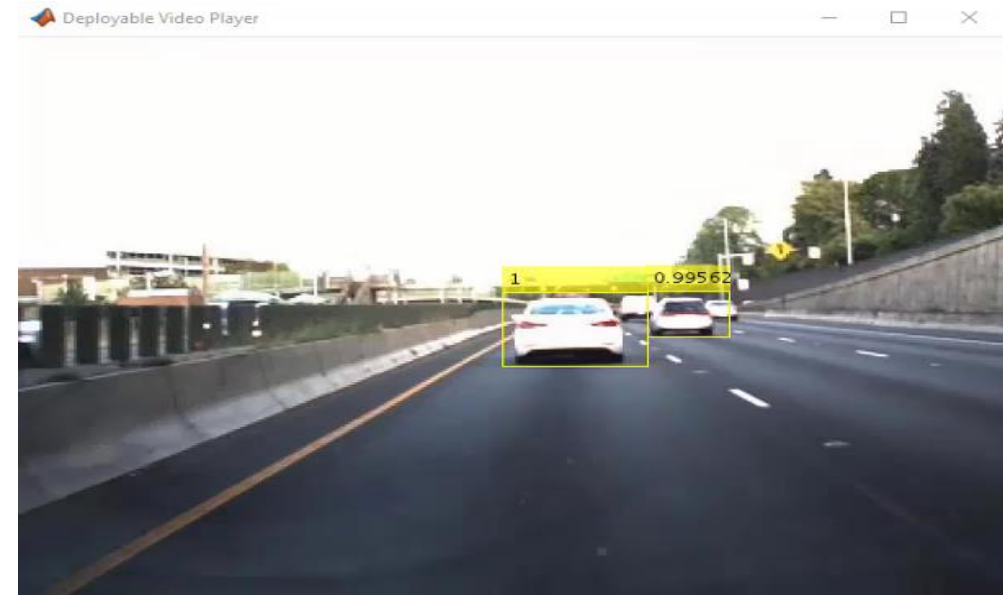
利用深度神经网络进行机器学习



深度学习典型应用



Semantic Segment



Objective Detection

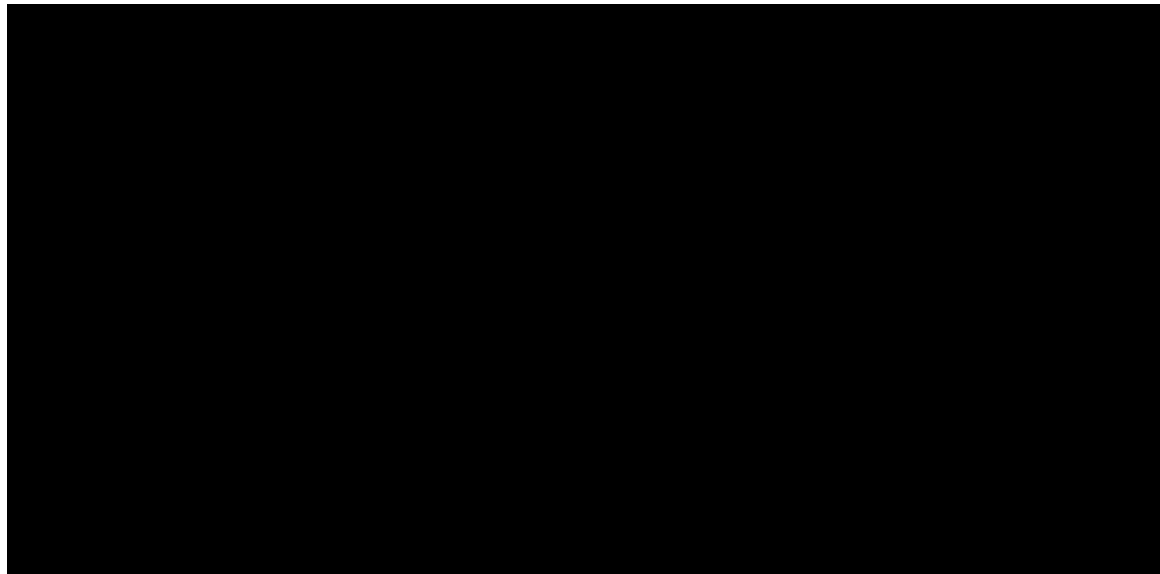


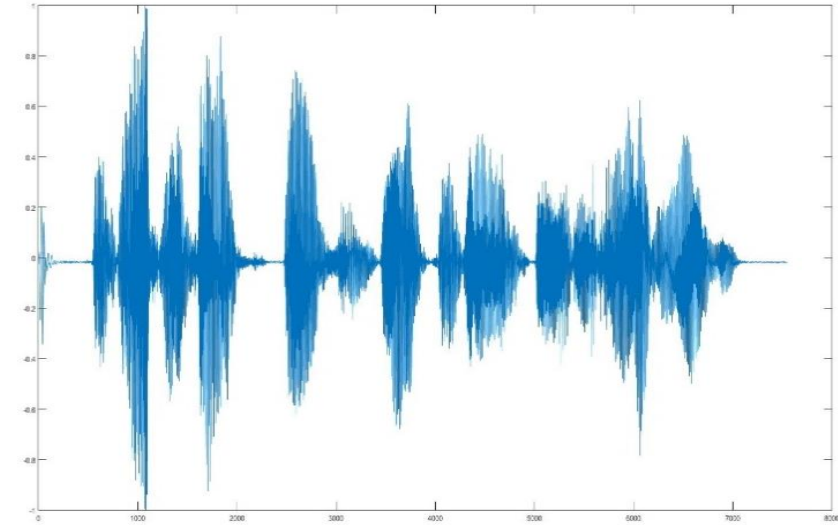
Image Classification

深度学习处理的数据类型

Image



Signal



Numeric

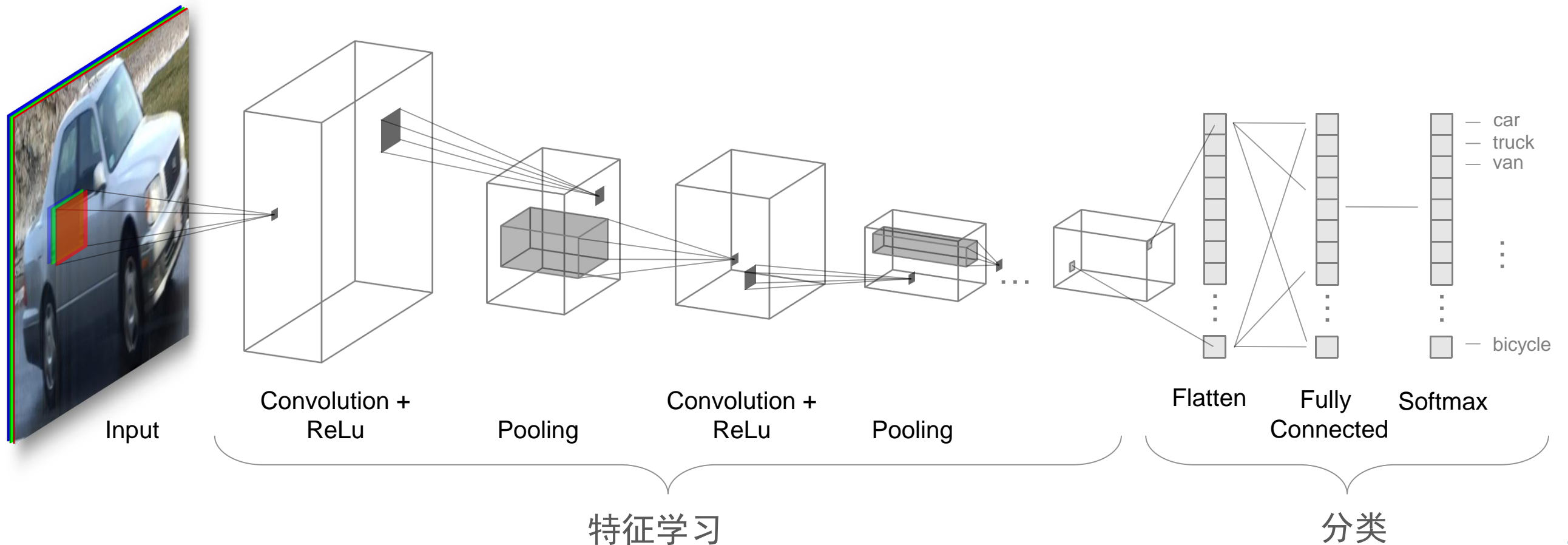
AgeCat	WeightQ	GroupCount	mean_BloodPressure	
Under 30	Q1	6	123.17	79.667
Under 30	Q2	3	120.33	79.667
Under 30	Q3	2	127.5	86.5
Under 30	Q4	4	122	78
30-39	Q1	12	121.75	81.75
30-39	Q2	9	119.56	82.556
30-39	Q3	9	121	83.222
30-39	Q4	11	125.55	87.273
Over 40	Q1	7	122.14	84.714
Over 40	Q2	13	123.38	79.385
Over 40	Q3	14	123.07	84.643
Over 40	Q4	10	124.6	85.1

Text

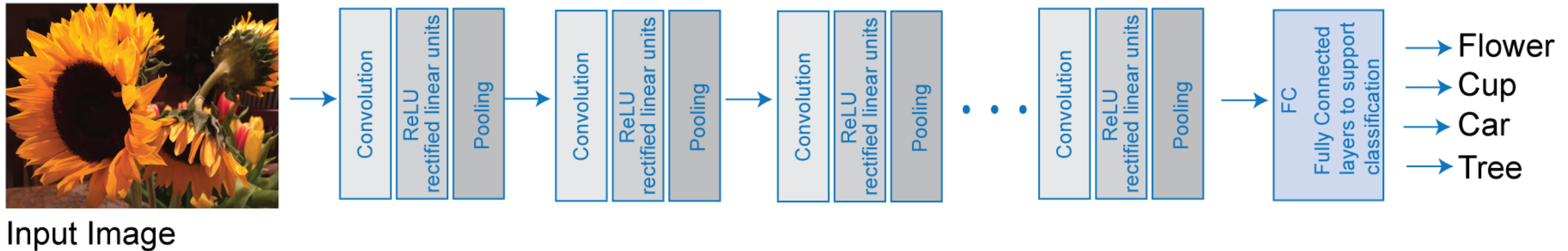


卷积神经网络 (Convolutional Neural Networks)

- 在原始数据集(e.g. images, text)上训练深度神经网络
- 由多个卷积层和池化层构建
- 消除手工的特征选取，通过层层抽象获取数据特征



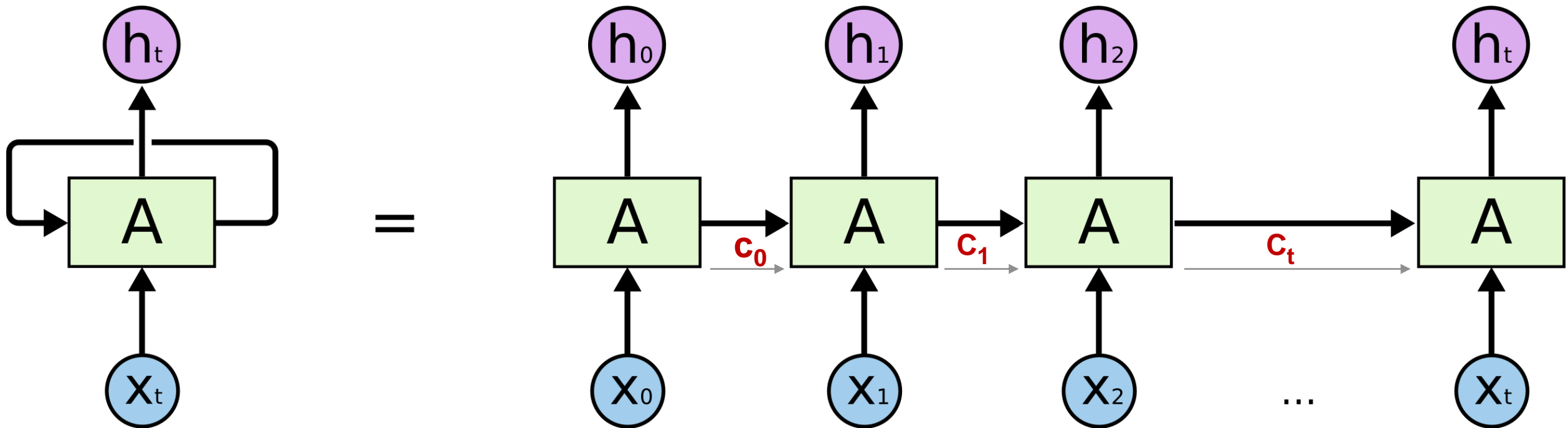
卷积神经网络 (Convolutional Neural Networks)



“Deep” in deep learning
refers to number of layers

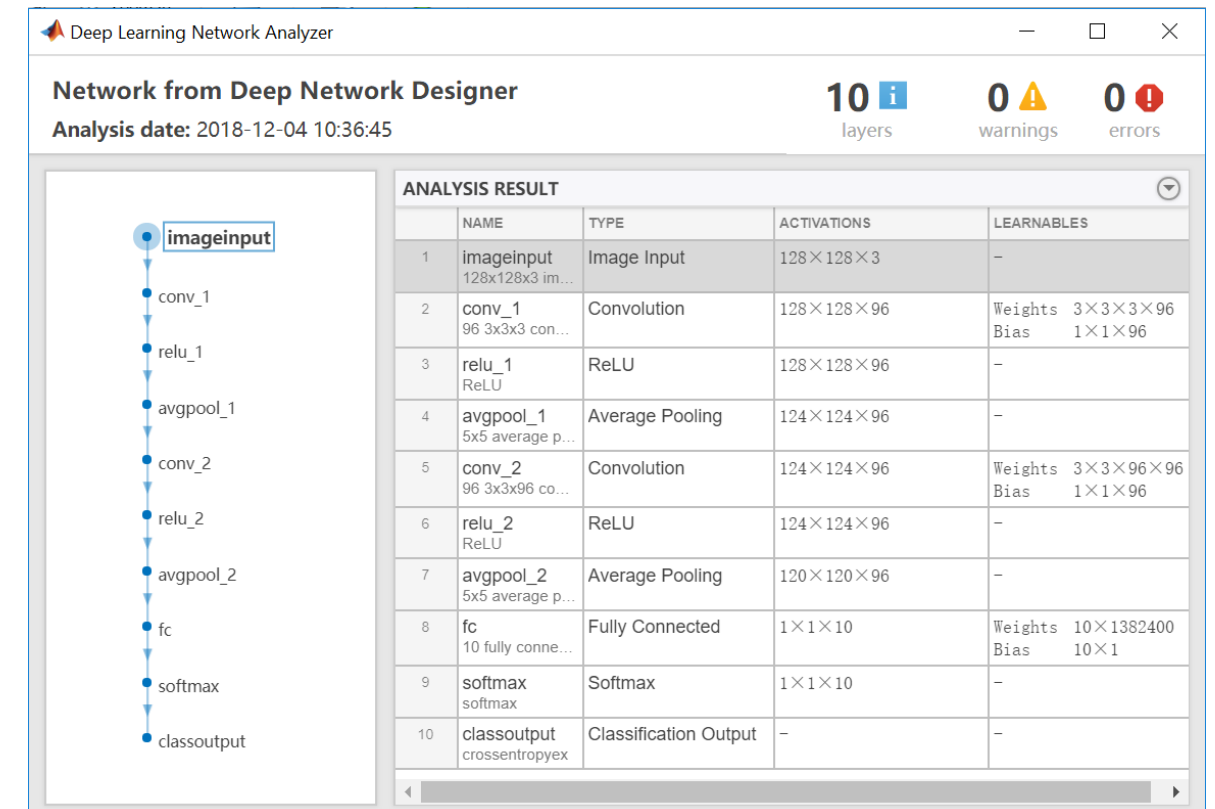
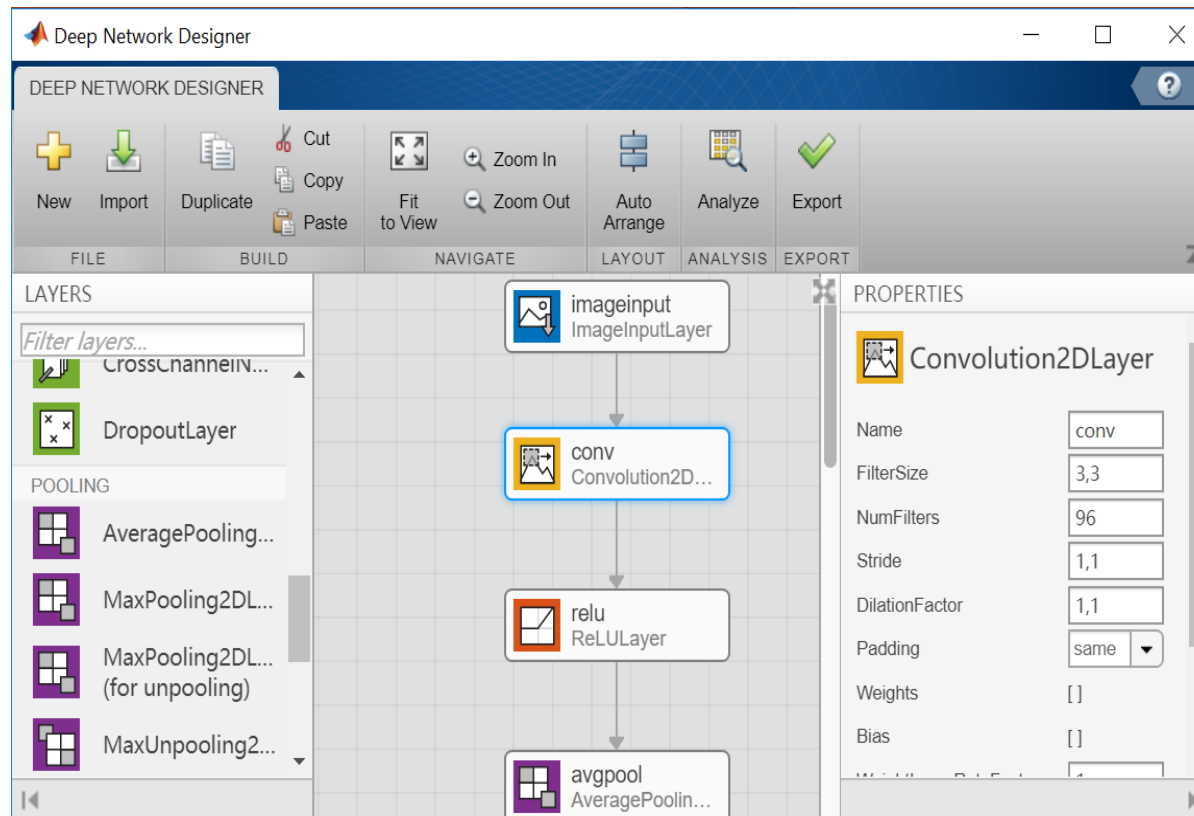
Long Short Term Memory Networks

- Recurrent Neural Network (RNN, 循环神经网络) 的一种
- 在整个过程中携带存储器单元 (RNN)
- 处理序列化的问题



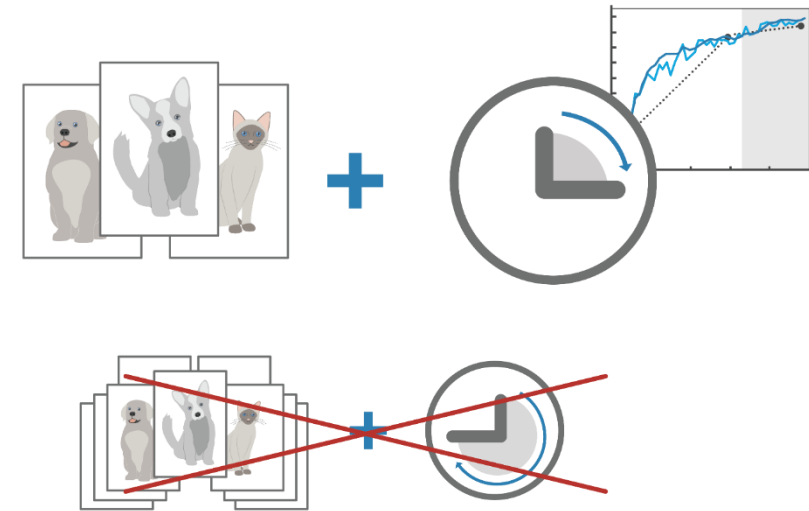
MATLAB构建深度神经网络

■ 构建和训练深度神经网络 – Deep Network Designer



- 使用预训练深度神经网络（迁移学习）

- 只需要较少的数据集和训练时间
- 使用已有的优秀的深度神经网络模型提取特征



([list of all models](#))

AlexNet
PRETRAINED
MODEL

VGG-16
PRETRAINED
MODEL

ResNet-50
PRETRAINED MODEL

ResNet-101
PRETRAINED MODEL

Caffe
IMPORTER

GoogLeNet
PRETRAINED
MODEL

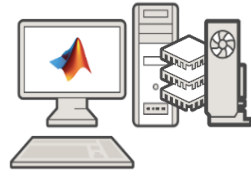
**TensorFlow-
Keras**
IMPORTER

Inception-v3
MODELS

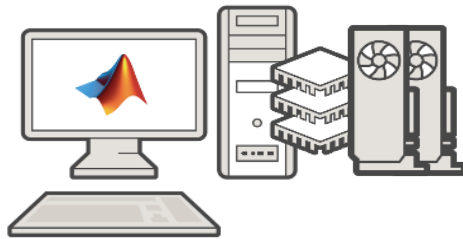
MATLAB 支持CPU, GPU, Multi-GPU and Clusters模型训练



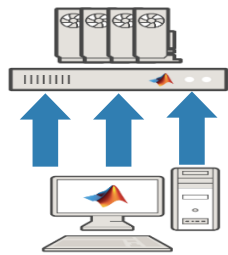
Single
CPU



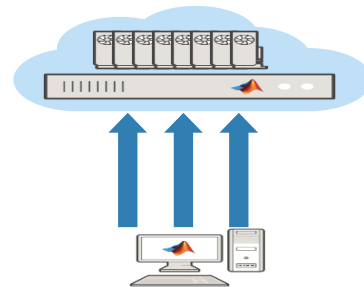
Single CPU
Single GPU



Single CPU, Multiple GPUs



On-prem server with
GPUs



Cloud GPUs
(AWS)

HOW TO TARGET?

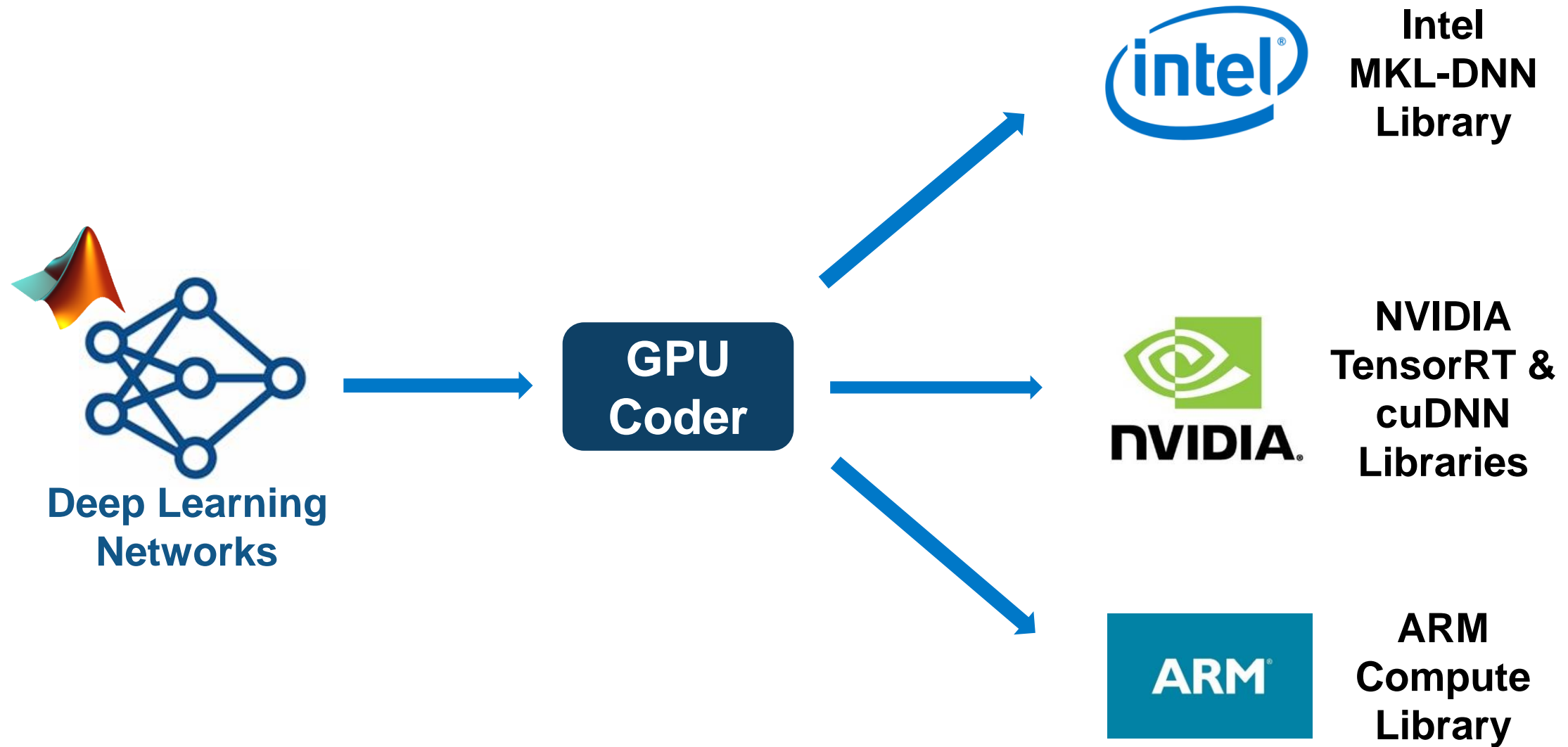
```
opts = trainingOptions('sgdm', ...
    'MaxEpochs', 100, ...
    'MiniBatchSize', 250, ...
    'InitialLearnRate', 0.00005, ...
    'ExecutionEnvironment', 'auto' );
```

```
opts = trainingOptions('sgdm', ...
    'MaxEpochs', 100, ...
    'MiniBatchSize', 250, ...
    'InitialLearnRate', 0.00005, ...
    'ExecutionEnvironment', 'multi-gpu' );
```

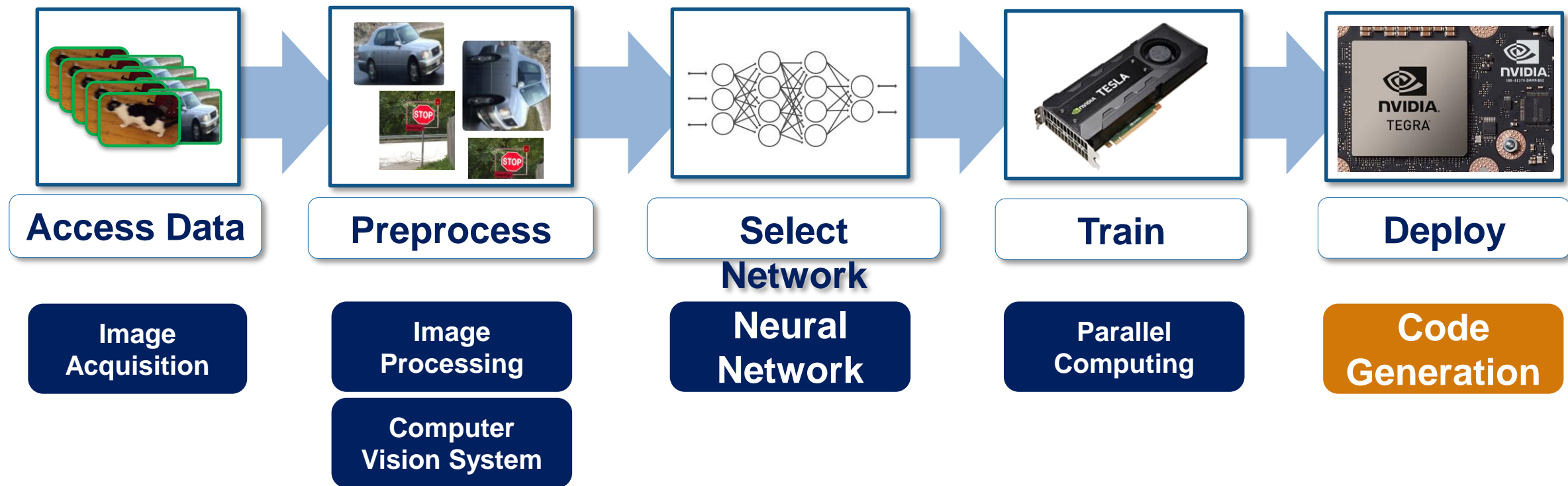
```
opts = trainingOptions('sgdm', ...
    'MaxEpochs', 100, ...
    'MiniBatchSize', 250, ...
    'InitialLearnRate', 0.00005, ...
    'ExecutionEnvironment', 'parallel' );
```


DEMOS

深度学习模型的部署



MATLAB Deep Learning



[Deep Learning with MATLAB](#)

谢谢

