

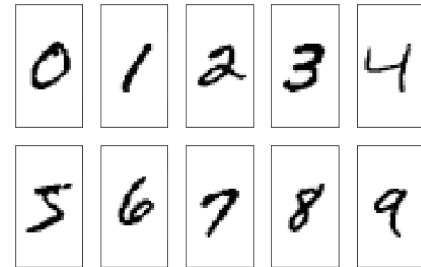


Continuing The Challenge

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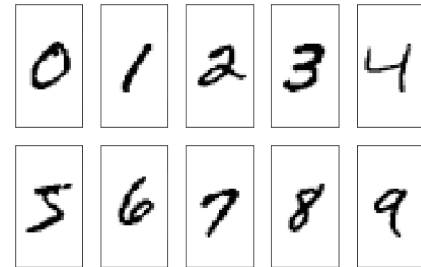
Patterns in Images

- Obtain
- Scrub
- Explore
- Model
- iNterpret

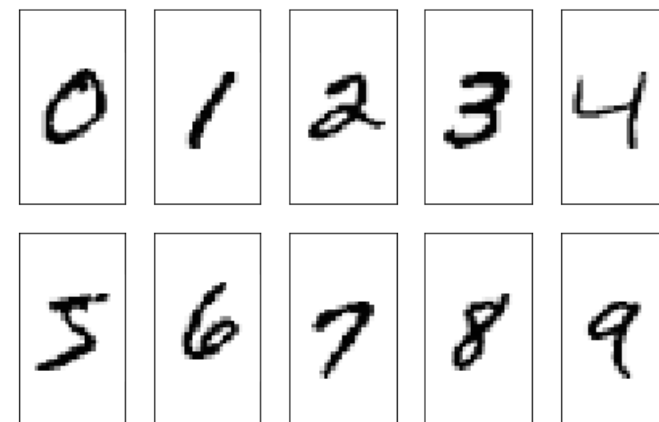


Our Challenge This Week?

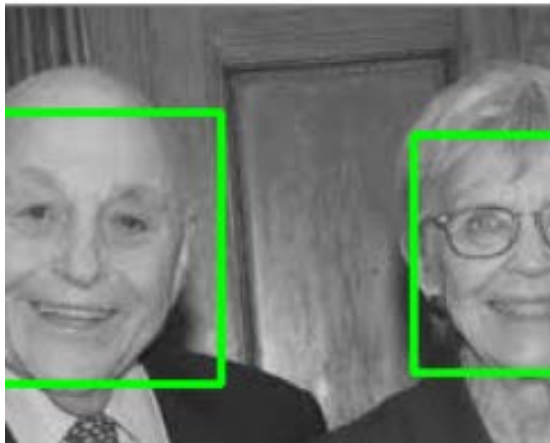
- Object Detection
- Image Recognition
- Facial Recognition
- Classifiers



Using Machine Learning for Classification



But How?

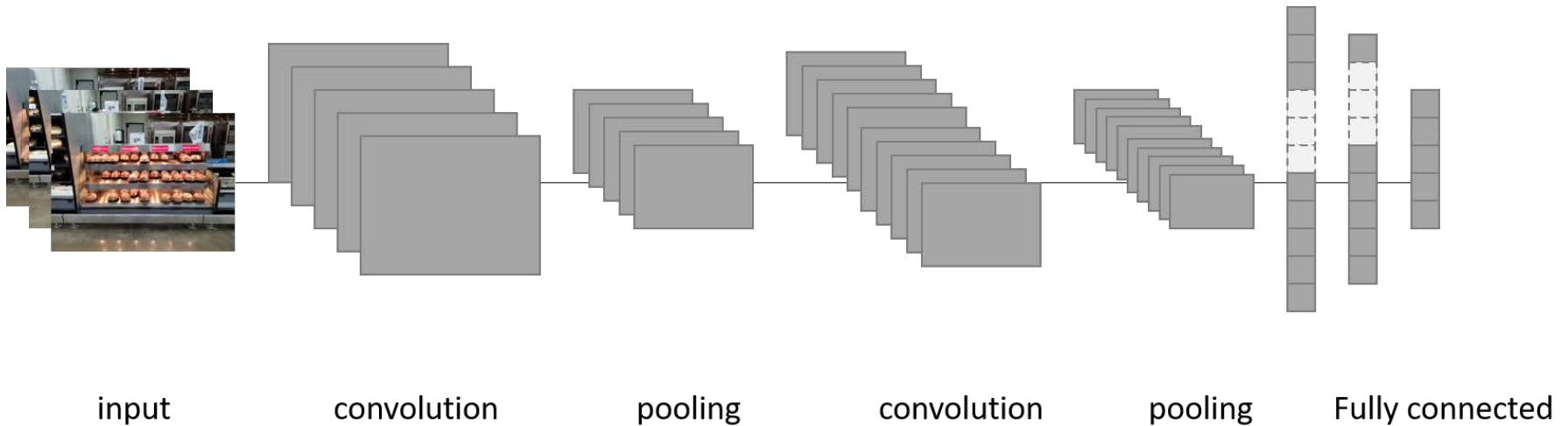




Base Architecture

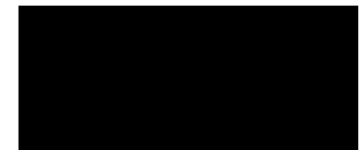
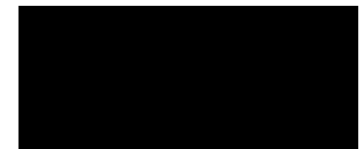
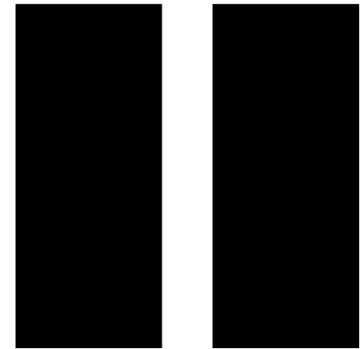
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Basic Architecture



But How Did We Get Here?

- Rosenblatt (1957)
- Hubel and Wiesel (1958)
- Local receptive fields
- Reaction to either horizontal or vertical



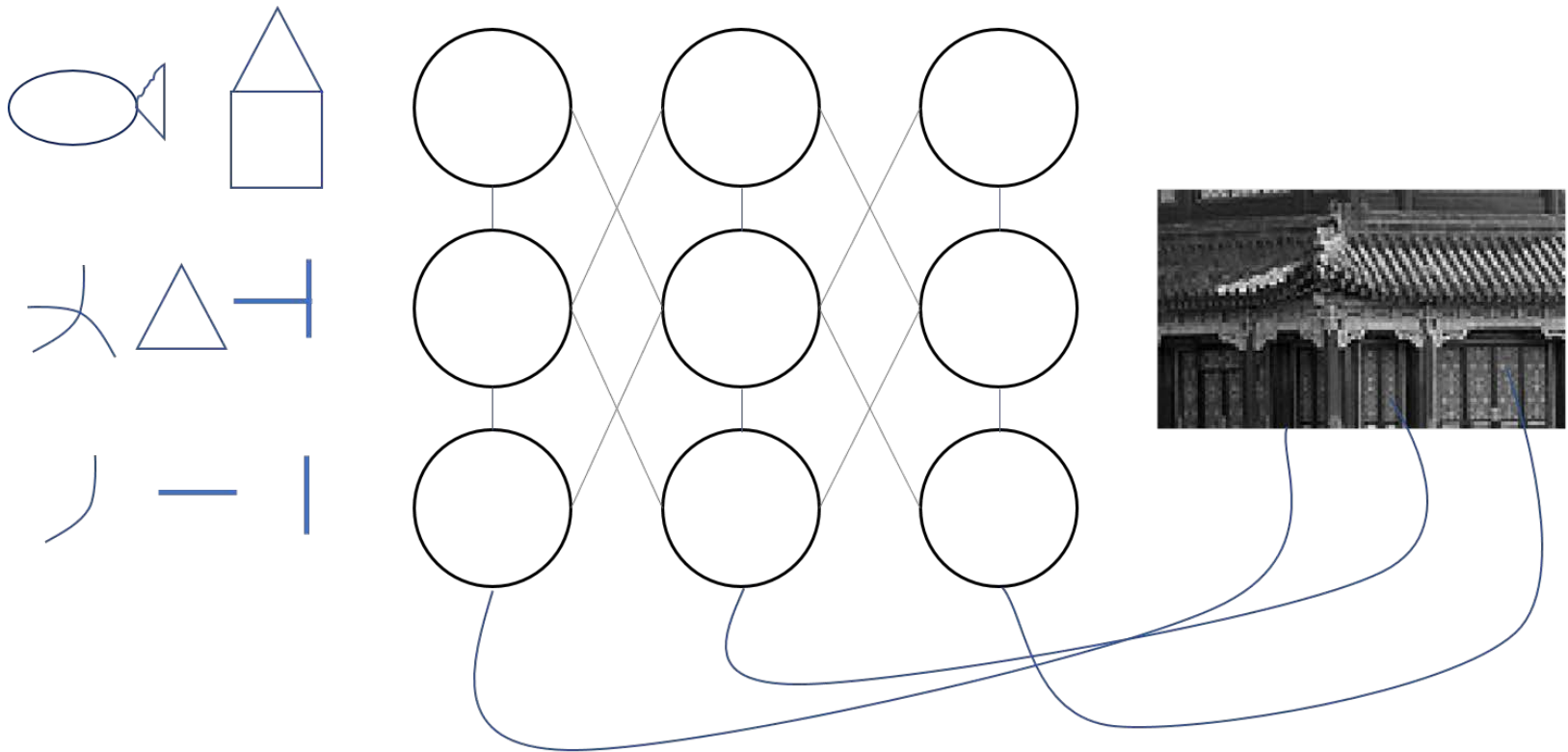
Visual Cortex



Visual Cortex (cont.)



Visual Cortex (cont.)



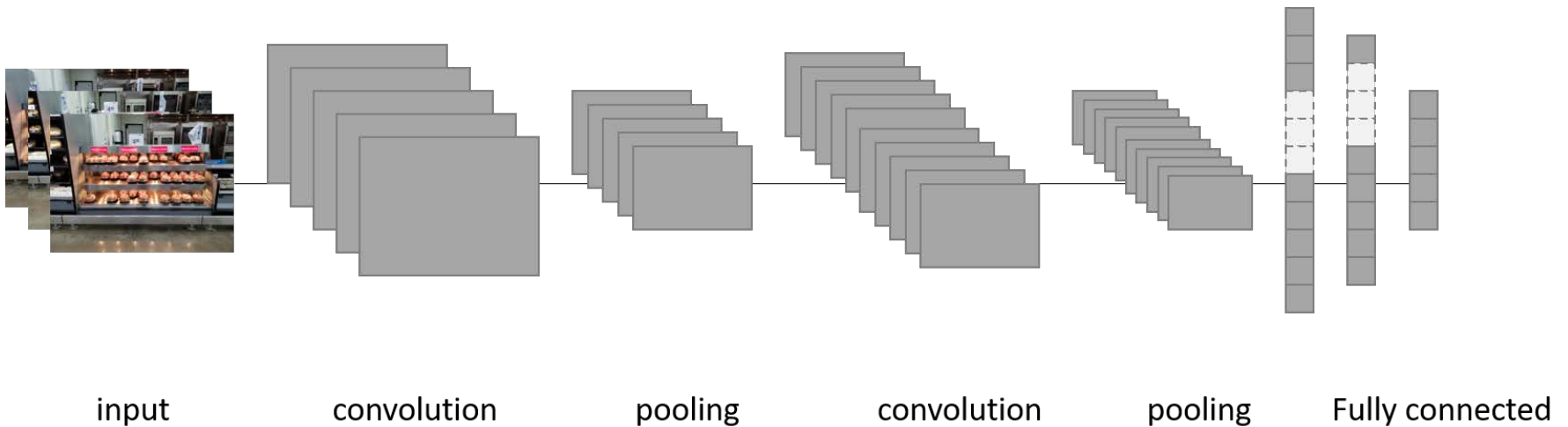
Source: Adapted from Geron (2017).



Convolution Network

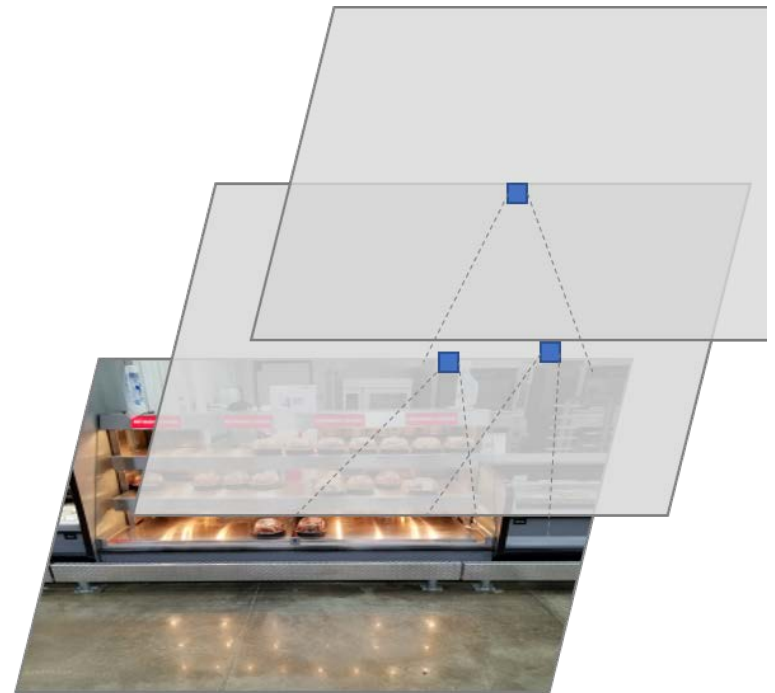
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Convolutional Networks

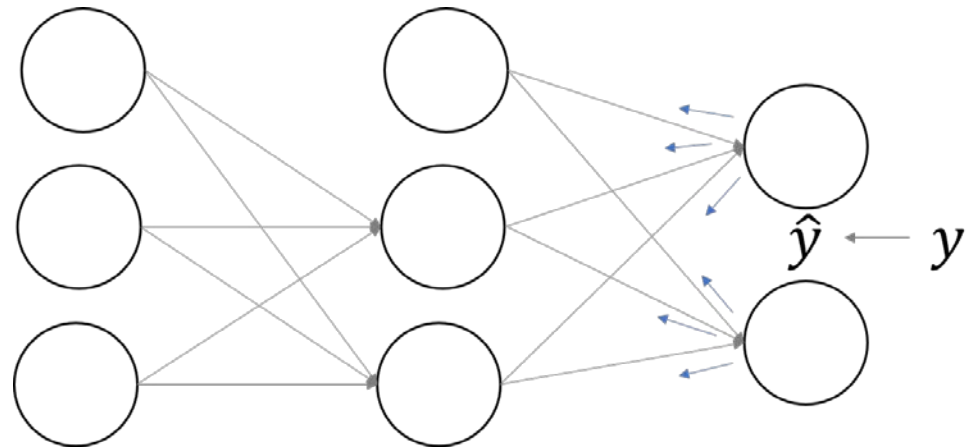
- Convolutional layers
- Pooling layers
- Partial connections
- Padding
- Filters



Source: Adapted from Geron (2017).

Recurrent Networks

- MLPs with time component
- Recurrent neurons
- Memory cells
- Long short-term memory (LSTM)

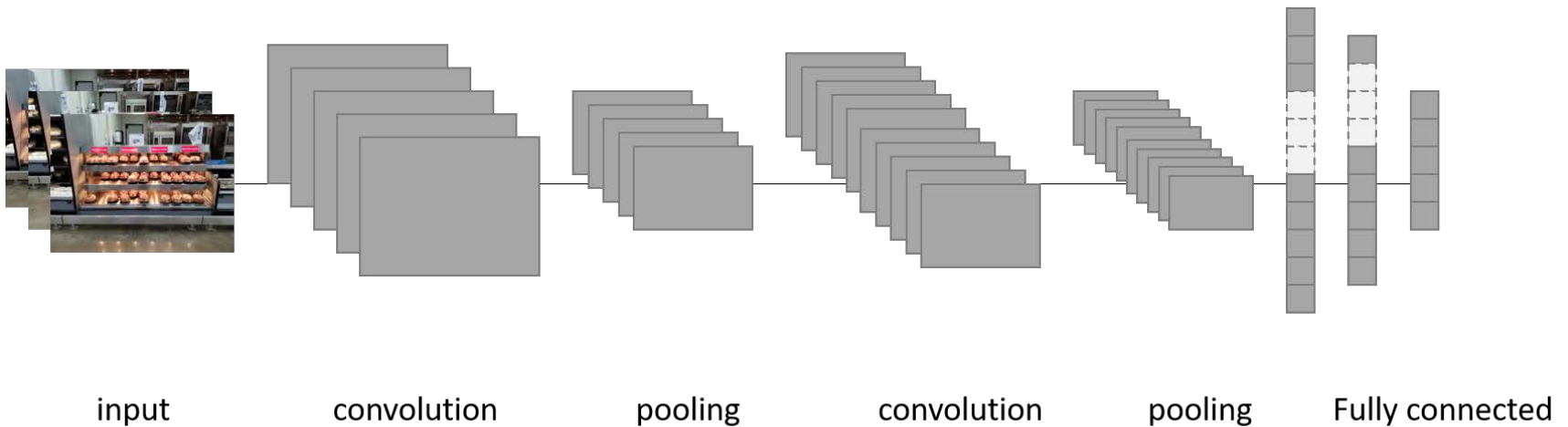




CNN Architectures

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Basic Architecture



LeNet-5

- Most widely known
- Yann LeCun (1998)
- Developed for Mnist
- Eight layers



AlexNet

- Alex Krizhevsky (2012)
- Developed for ILSVRC
- 11 layers



GoogLeNet

- Google Research (2015)
- Developed for ILSVRC
- Inception model
- 23 layers



ResNet

- K. He, et al. (2015)
- Developed for ILSVRC
- Skip connections
- 152 layers

