Attendance:
tiny.cc/event-attendance

App Dev League

Day 4: CNNs

Agenda

1. Review Day 3
2. CNNs
3. Kahoot
4. Project

Day 3 Review

Artificial Intelligence

- Human intelligence shown in machines
- Machinery that learns from experience
- Examples: Google/Siri assistant, self-driving cars, recommendation algorithms

ML Model Architectures

- ➔ Linear Regression
- ➔ Logistic Regression
- ➔ Random Forests
- ➔ Neural Networks
- ➔ CNNs

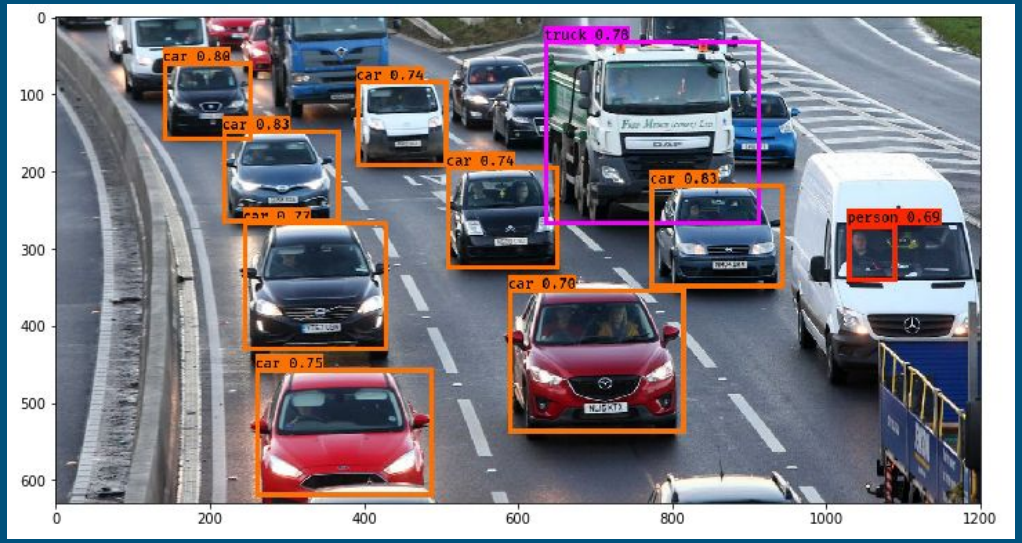
Neural Networks

- ➔ Main type of ML Model
- ➔ Simulates Human Brain
- ➔ Made of interconnected “neurons”
- ➔ Each neuron has an input, decider, and output
- ➔ Neuron weighs inputs and uses activation function to create output
- ➔ Network has input, output, and hidden layers
- ➔ Forward/Back Propagation adjust parameters to increase model accuracy
- ➔ Activation Functions help networks identify patterns in data

CNNs

Applications of Convolutional Networks:

- ➔ Self driving cars
  - ◆ Need to detect other cars so it can avoid collisions
  - ◆ Uses CNNs to analyze sections of images to determine if there is a vehicle/pedestrian

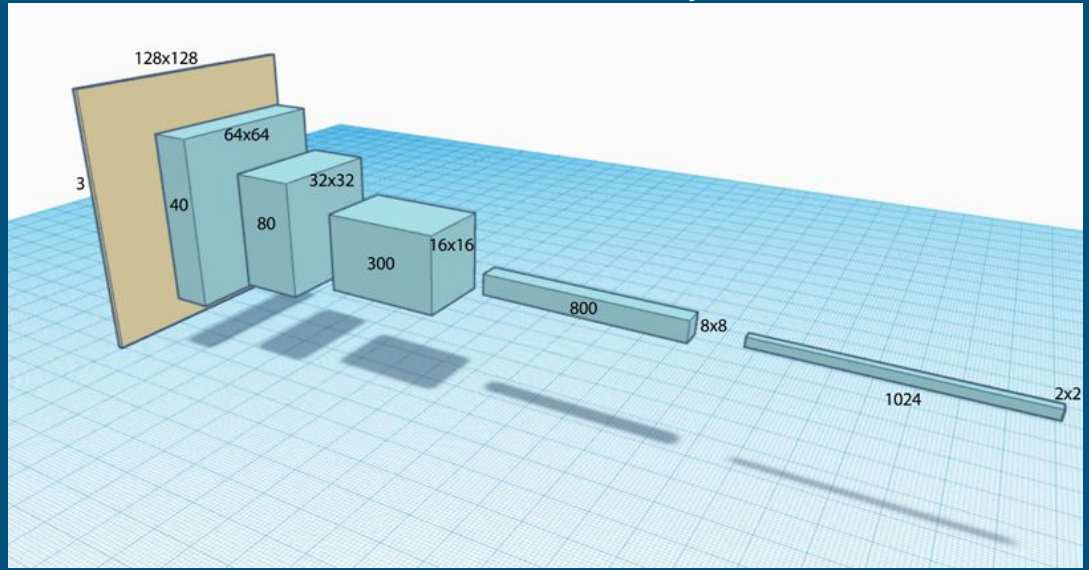


Convolutional Neural Networks

- ➔ Convolutional Neural Networks (CNNs) are used for image classification, segmentation and processing
- ➔ Similar to normal Neural Networks, but have convolutional layers instead of normal dense layers
- ➔ Convolutional layers apply filters to the original image and then a feature map is generated for each filter
- ➔ An activation function will then decide if a feature is present in the image or not

How a Convolutional Neural Network works

- ➔ Decrease width and increase “depth”
  - ◆ Improves feature extraction
  - ◆ Makes it easier for another network to identify features WHILE maintaining important data

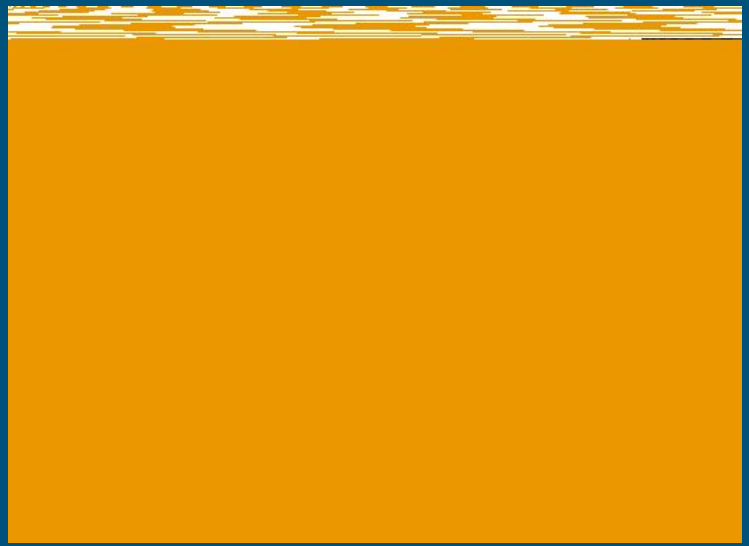


The Convolutional Layer

- Starts with the Convolutional Kernel
  - The kernel scans over the input in steps
  - The length of the step is the **stride length**
  - The kernel itself is a matrix; the sum of the products of the corresponding element in the kernel and the element in the image is placed in the corresponding cell of the output
    - In this case, the matrix is

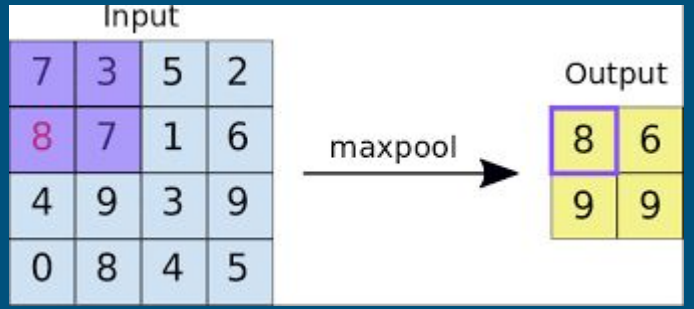
1	0	1
0	1	0
1	0	1

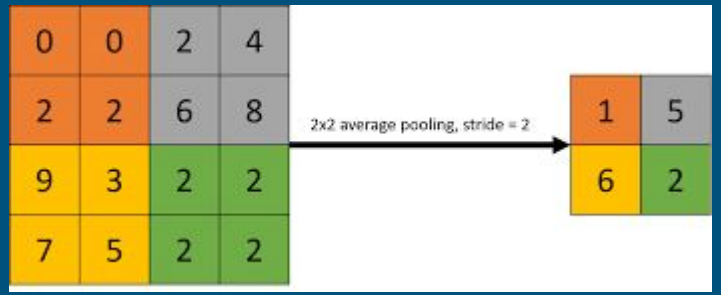
  - The matrix formed after the kernel traverses the entire input is called the **convolved matrix**.



Pooling

- Similarly to the Convolutional Layer, the Pooling layer is responsible for reducing the spatial size of the Convolved Feature.
  - This is to decrease the computational power necessary to process the input
- There are two types of Pooling: Max Pooling and Average Pooling.
  - Max Pooling returns the maximum value from the portion of the image covered by the Kernel.
  - Average Pooling returns the average of all the values from the portion of the image covered by the Kernel.





Kahoot

kahoot.it

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Project

Now let’s take a look at some of the code!

More Resources

Towards Data Science

Andrew Ng Coursera Course on CNNs

THANKS!

ANY QUESTIONS?

You can find more info @

- https://www.appdevleague.org
- https://linktr.ee/AppDevLeague