Artwork Classification with Convolutional Neural Network

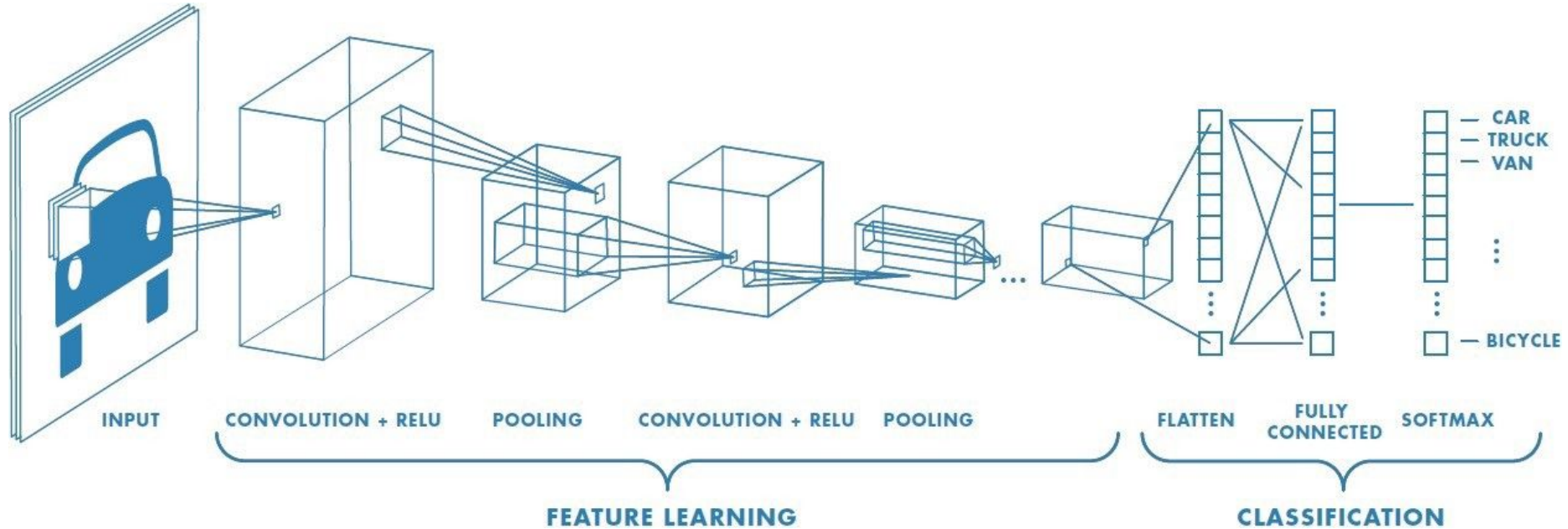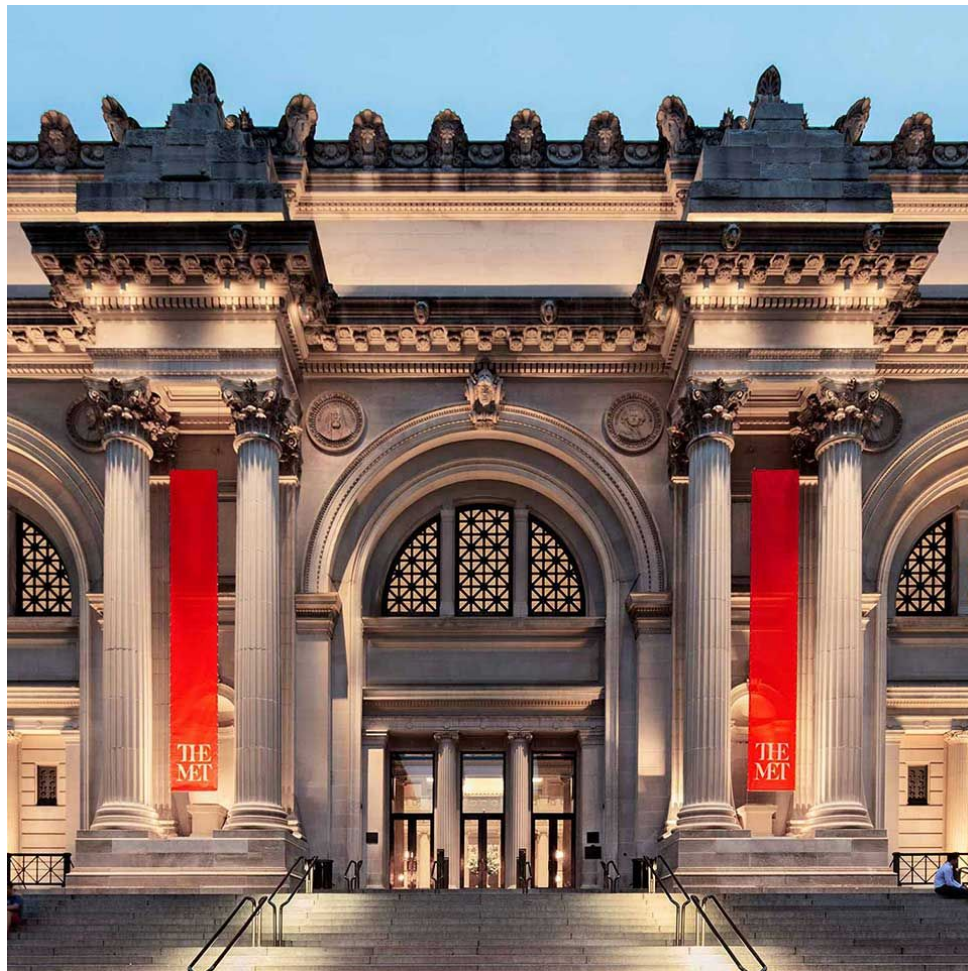Zach Osking
Capstone 2 Project
Springboard

Background

Background

- Museums and auction houses have a need to classify images of art
- Using a human to do this is expensive
- Can we automate the higher levels of classification?

Convolutional Neural Network

# Dataset

The Metropolitan Museum of Art API

```python
#request all information for each work of art in the Met public database
url = 'https://collectionapi.metmuseum.org/public/collection/v1/objects/'

y = 0
all_art = []

for piece in range(len(object_IDs)):
    #since each piece needs to be requested individually, takes the
    obj_url = url + str(object_IDs[y])
    object_info = requests.get(obj_url, headers={ "Accept" : "application/json"})
    artwork = object_info.json()
    all_art.append(artwork)
    y += 1
    #print(str(y) + ' ' + ' loaded')

all_art_df = pd.DataFrame(all_art)
all_art_df.to_csv('art_df.csv')
```
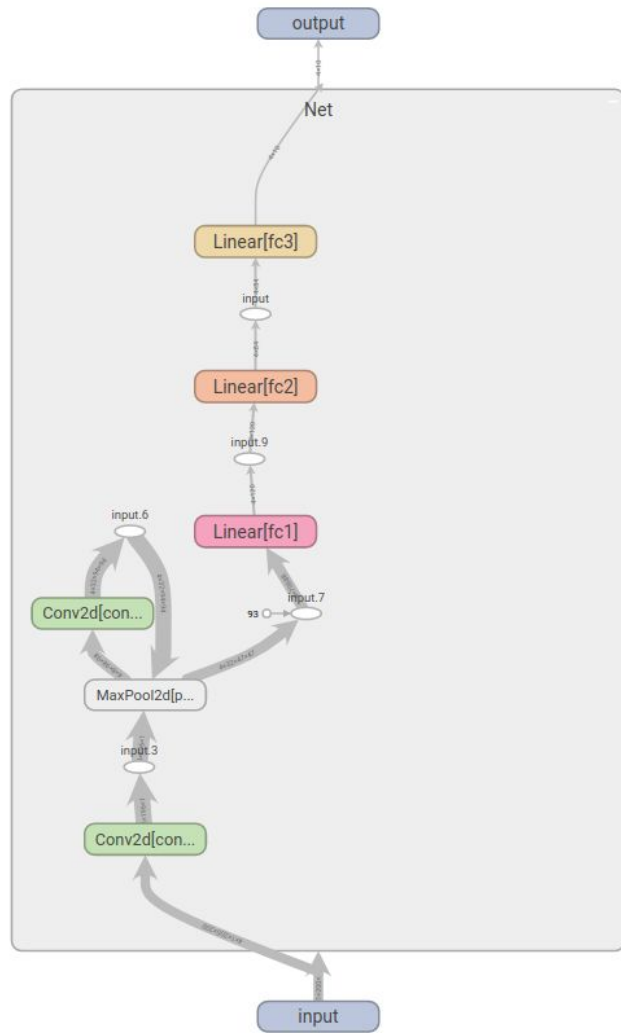
training loss
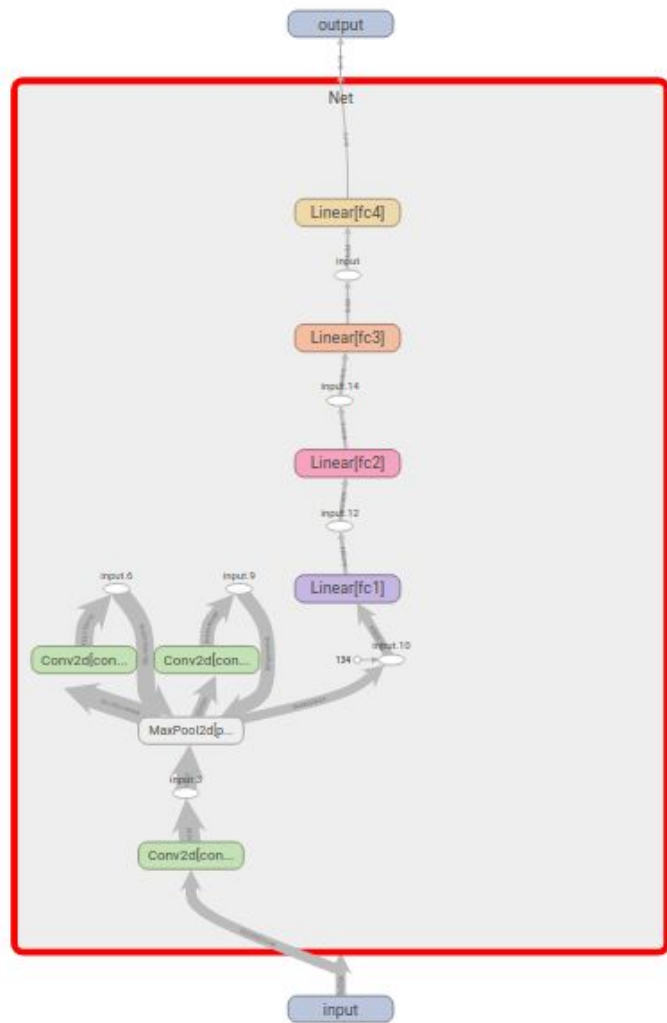
Accuracy of Ancient Near Eastern Art :   0 %
Accuracy of Arms and Armor :   0 %
Accuracy of Asian Art : 85 %
Accuracy of Costume Institute :   2 %
Accuracy of Egyptian Art : 30 %
Accuracy of European Sculpture and Decorative Arts :   6 %
Accuracy of Greek and Roman Art : 13 %
Accuracy of Islamic Art :   0 %
Accuracy of Medieval Art :   0 %
Accuracy of The American Wing :   0 %

Final CNN

Real-time visualization of training loss

training loss

Name	Smoothed	Value	Step	Time	Relative
art_classifier_1_moredata_normalized	1.971	1.963	10.54k	Thu Sep 3, 19:00:44	45m 37s
art_classifier_3_more_layers_epochs	1.616	1.601	22.77k	Thu Oct 1, 01:05:56	7h 48m 20s
art_classifier_resnet	2.414	2.415	16.85k	Thu Oct 1, 21:00:35	7h 15m 27s
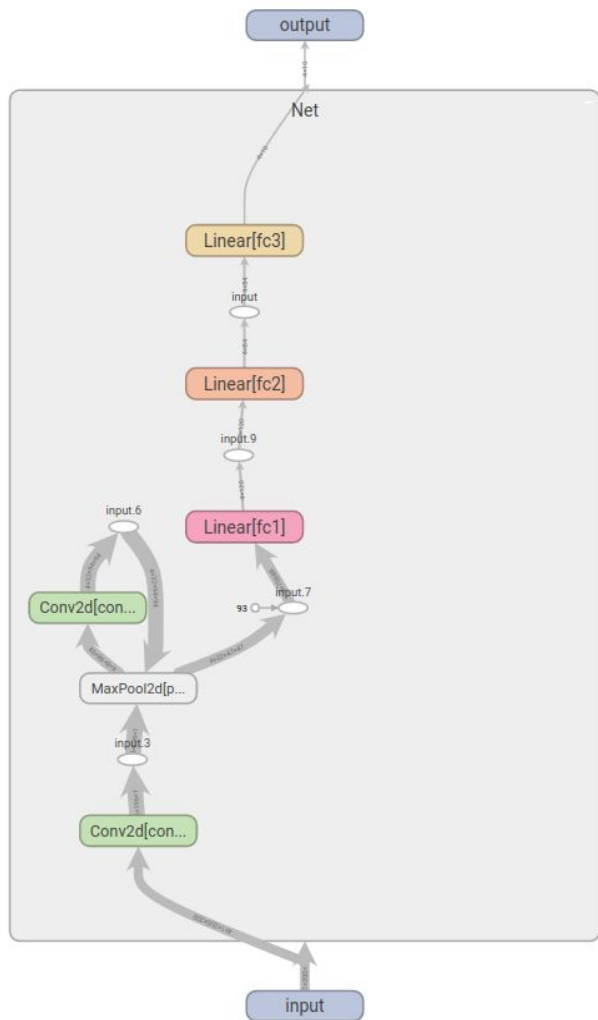
Confusion matrix

True label	Ancient Near Eastern Art	Arms and Armor	Asian Art	Costume Institute	Egyptian Art	European Sculpture and Decorative Arts	Greek and Roman Art	Islamic Art	Medieval Art	The American Wing
Ancient Near Eastern Art	6	232	357	56	206	1038	2207	3	3	202
Arms and Armor	0	98	108	28	60	279	922	0	1	42
Asian Art	16	909	1030	342	882	3250	7708	6	7	620
Costume Institute	1	94	244	88	302	986	3455	0	3	61
Egyptian Art	12	440	817	140	278	1761	3814	1	6	344
European Sculpture and Decorative Arts	16	444	506	234	632	1376	4729	3	2	343
Greek and Roman Art	8	578	758	136	469	1702	3053	1	8	338
Islamic Art	19	246	356	116	140	1890	3118	2	9	340
Medieval Art	7	258	440	61	139	1469	2166	0	3	136
The American Wing	13	238	318	77	340	959	2791	0	0	169

Predicted label

Transfer Learning
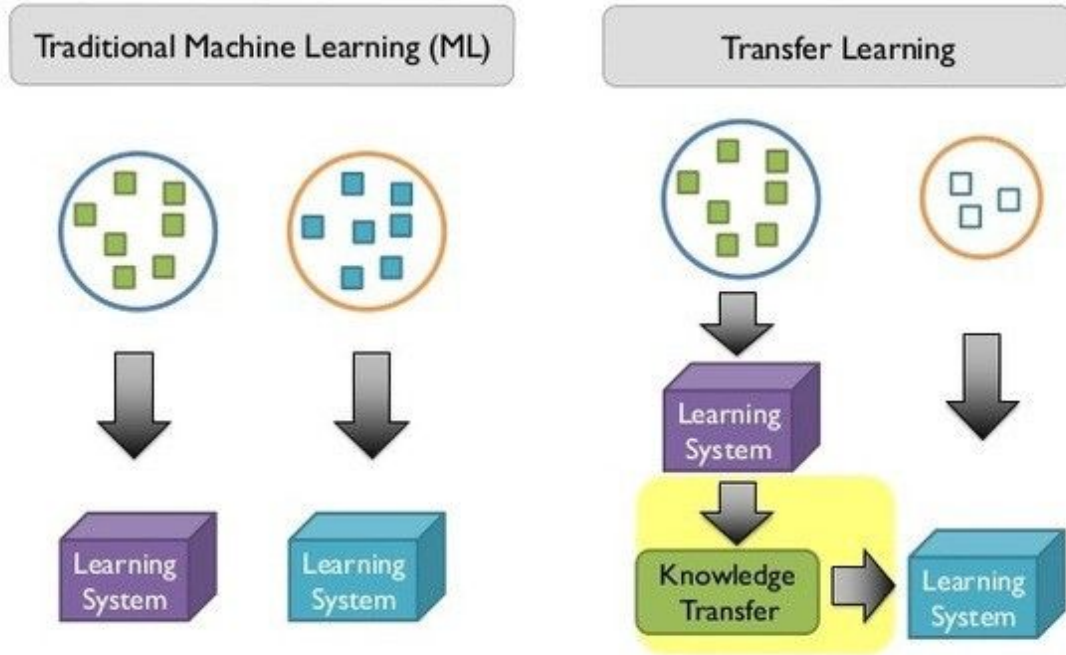
ResNet

Confusion matrix

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Predicted label