Homework 0

# Problem 1

First Image:

A cat looking at the camera

Description automatically generated

Prediction:

[('tiger cat', 79.66744232177734), ('tabby, tabby cat', 19.672622680664062), ('Egyptian cat', 0.5914100408554077), ('tiger, Panthera tigris', 0.023916659876704216), ('lynx, catamount', 0.007003657054156065)]

I suspect that the misclassification of a tiger is due to the size of the cat not being apparent in the image. The model must primarily rely on the eyes, ears, and coat of the cat to determine what it is. This extends to the other misclassifications presented for tiger and lynx. The tabby cat classification is likely matching that the species is a cat, but the coat is not tabby, hence the low confidence. Similar with the Egyptian Cat.

Second Image:

A rocket taking off from a launchpad

Description automatically generated with medium confidence

[('space shuttle', 99.93167114257812), ('missile', 0.036954112350940704), ('projectile, missile', 0.03135554865002632), ('warplane, military plane', 1.5263885870808735e-05), ('mashed potato', 5.9588342082861345e-06)]

The classification for the first 3 most likely is highly accurate. The prediction of warplane is likely due to the fire exiting the rocket looking like an afterburner on a fighter jet and this combined with the wings led to misclassification. The mashed potato classification is first and foremost hysterical but makes sense. The large puffy clouds look somewhat like mashed potato leading to this error.

Third Image:

A picture containing sky, ride, outdoor, water

Description automatically generated

[('steel arch bridge', 36.37282943725586), ('pier', 27.173280715942383), ('suspension bridge', 10.464879989624023), ('fireboat', 6.59556770324707), ('crane', 3.4209132194519043)]

The misclassification of steel bridge, suspension bridge, and crane are all likely to the steel girding that is present in the roller coaster and Ferris wheel. The tall pillars that support the coaster also could be seen as part of a bridge or crane. Classification is made further difficult by the variety of items in the shot. The pier classification is likely due to the pillars that look like those that would hold up a pier. The fireboat classification is likely due to the blue and red color scheme plus the apparent presence of a pier that the model perceives.

Fourth Image: A picture containing orange, transport, car

Description automatically generated

[('sports car, sport car', 98.20326232910156), ('convertible', 0.7206903100013733), ('car wheel', 0.6490448713302612), ('racer, race car, racing car', 0.3668653070926666), ('crash helmet', 0.022363141179084778)]

The majority of these classifications are correct with the only error being crash helmet which is likely due to most training examples of sports cars also containing drivers with a crash helmet.

Fifth Image:

A picture containing water, transport, weapon

Description automatically generated

[('space shuttle', 42.99848175048828), ('aircraft carrier, carrier, flattop, attack aircraft carrier', 27.45186996459961), ('missile', 14.654141426086426), ('projectile, missile', 10.323227882385254), ('tank, army tank, armored combat vehicle, armoured combat vehicle', 2.2582790851593018)]

This is an interesting case. The fireball from the guns looks like a rocket launch which the model was trained to associated with rockets and the space shuttle, so we see the misclassification of space shuttle, missile, and projectile missile. The armored combat vehicle classification is likely due to most training images of large, armored guns being a tank. The size of the ship likely contributed to the classification of aircraft carrier in part due to the chance that battleship was not even part of the labels.

# Problem 2:

Image 1:

A picture containing horse, grass, outdoor, brown

Description automatically generated

A couple of zebras walking in a field

Description automatically generated with low confidence

Image 2:

A herd of horses running

Description automatically generated with low confidence

A herd of zebras in a field

Description automatically generated with medium confidence

Some of the mis colorings are likely due to how massed the horses are making it difficult to determine that the shapes are actually horses.

Image 3:

A horse running on grass

Description automatically generated

A zebra running on grass

Description automatically generated with medium confidence

Image 4:

A picture containing horse, brown, outdoor, mammal

Description automatically generated

A picture containing horse, brown, outdoor, mammal

Description automatically generated

The error in coloring is likely due to two features. One is that the whole horse’s body is not shown indicating the model was likely trained with full views of horses. The other factor is the manes of the horses do not appear to be super normal, they are knotted and different.

Image 5:

A picture containing grass, sky, outdoor, mammal

Description automatically generated

A couple of zebras stand near each other

Description automatically generated

The lack of full coloring is likely due to the full body not being shown making boundaries for color hard to determine.

# Part 3:

Resnet:

Text, scatter chart

Description automatically generated with medium confidence

ResNetGen:

Graphical user interface, text

Description automatically generated

# Part 4:

A cat looking at the camera

Description automatically generated

tiger cat 0.6524982452392578

tabby, tabby cat 0.3171881139278412

Egyptian cat 0.023562101647257805

tiger, Panthera tigris 0.00249707093462348

lynx, catamount 0.0022880826145410538

Second Image:

A rocket taking off from a launchpad

Description automatically generated with medium confidence

space shuttle 0.9988172650337219

missile 0.0006802126881666481

projectile, missile 0.0004809879173990339

mashed potato 2.014709752984345e-05

steam locomotive 4.26946627385405e-0

The classification for the first 3 most likely is highly accurate. The mashed potato classification is first and foremost hysterical but makes sense. The large puffy clouds look somewhat like mashed potato leading to this error. The steam locomotive classification is similar as the smoke was likely present in the training samples for steam locomotive

Third Image:

A picture containing sky, ride, outdoor, water

Description automatically generated

steel arch bridge 0.9232251048088074

coil, spiral, volute, whorl, helix 0.010669747367501259

suspension bridge 0.010072924196720123

pier 0.005228039808571339

harp 0.004433175083249807

The misclassification of steel bridge and suspension bridge are all likely to the steel girding that is present in the roller coaster and Ferris wheel. The tall pillars that support the coaster also could be seen as part of a bridge. Classification is made further difficult by the variety of items in the shot. The pier classification is likely due to the pillars that look like those that would hold up a pier. The harp classification is likely due to the circus wheel being somewhat similar to the shape of a harp.

Fourth Image: A picture containing orange, transport, car

Description automatically generated

sports car, sport car 0.9702891707420349

car wheel 0.017880164086818695

racer, race car, racing car 0.004553707782179117

cab, hack, taxi, taxicab 0.0022443532943725586

grille, radiator grille 0.0020572750363498926

The Taxi misclassification could be because of the color of the car which the model was trained to associate with taxis cabs. The radiator grille classification is somewhat accurate although not the main portion of the image.

Fifth Image:

A picture containing water, transport, weapon

Description automatically generated

missile 0.4829239845275879

projectile, missile 0.22751489281654358

space shuttle 0.16545383632183075

amphibian, amphibious vehicle 0.02598855458199978

aircraft carrier, carrier, flattop, attack aircraft carrier 0.022052939981222153

The missile, space shuttle, and projectile classification is likely due to fireballs. These are likely present in the training images of these labels. The amphibian vehicle and aircraft carrier are likely due to the size and color of ship which were likely the same color as training images for these classes.

# Complexity:

Graphical user interface, text

Description automatically generated