Convolutional Neural Networks

Project: Write an Algorithm for Landmark Classification

A simple app

In this notebook we build a very simple app that uses our exported model.

> ? Note how we are not importing anything from our source code (we do not use any module from the `src` directory). This is because the exported model, differently from the model weights, is a standalone serialization of our model and therefore it does not need anything else. You can ship that file to anybody, and as long as they can import `torch`, they will be able to use your model. This is very important for releasing pytorch models to production.

Test your app

Go to a search engine for images (like Google Images) and search for images of some of the landmarks, like the Eiffel Tower, the Golden Gate Bridge, Machu Picchu and so on. Save a few examples locally, then upload them to your app to see how your model behaves!

The app will show the top 5 classes that the model think are most relevant for the picture you have uploaded

```
!jupyter nbextension enable --py widgetsnbextension
```

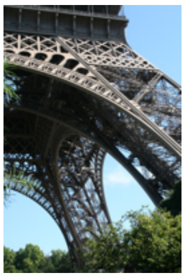
```
Enabling notebook extension jupyter-js-widgets/extension...
Paths used for configuration of notebook: 
    	/root/.jupyter/nbconfig/notebook.json
Paths used for configuration of notebook: 

      - Validating: OK
Paths used for configuration of notebook: 
    	/root/.jupyter/nbconfig/notebook.json
```

```
from ipywidgets import VBox, Button, FileUpload, Output, Label
from PIL import Image
from IPython.display import display
import io
import numpy as np
import torchvision
import torchvision.transforms as T
import torch

# Decide which model you want to use among the ones exported
learn_inf = torch.jit.load("/content/original_exported.pt")

# Putting back btn_upload to a widget for next cell
btn_upload = FileUpload()
btn_run = Button(description="Classify")
out_pl = Output()
out_pl.clear_output()

def on_click_classify(change):

    p = list(btn_upload.value.keys())
    p = p[0]

    # Load image that has been uploaded
    fn = io.BytesIO(btn_upload.value[p]['content'])

    img = Image.open(fn)
    img.load()

    # Let's clear the previous output (if any)
    out_pl.clear_output()

    # Display the image
    with out_pl:

        ratio = img.size[0] / img.size[1]
        c = img.copy()
        c.thumbnail([ratio * 200, 200])
        display(c)

    # Transform to tensor
    timg = T.ToTensor()(img).unsqueeze_(0)

    # Calling the model
    softmax = learn_inf(timg).data.cpu().numpy().squeeze()
    # Get the indexes of the classes ordered by softmax
    # (larger first)
    idxs = np.argsort(softmax)[::-1]

    # Loop over the classes with the largest softmax
    for i in range(5):
        # Get softmax value
        p = softmax[idxs[i]]

        # Get class name
        landmark_name = learn_inf.class_names[idxs[i]]

        labels[i].value = f"{landmark_name} (prob: {p:.2f})"


btn_run.on_click(on_click_classify)

labels = []
for _ in range(5):
    labels.append(Label())

wgs = [Label("Please upload a picture of a landmark"), btn_upload, btn_run, out_pl]
wgs.extend(labels)

VBox(wgs)
```

Please upload a picture of a landmark

Upload (1)

Classify



16.Eiffel_Tower (prob: 0.90)

31.Washington_Monument (prob: 0.02)

29.Petronas_Towers (prob: 0.02)

15.Central_Park (prob: 0.02)

43.Gullfoss_Falls (prob: 0.01)

```
code/__torch__/torchvision/transforms/functional.py:188: UserWarning: The default va
```

(optional) Standalone app or web app

You can run this notebook as a standalone app on your computer by following these steps:

1. Download this notebook in a directory on your machine
2. Download the model export (for example, `checkpoints/transfer_exported.pt`) in a subdirectory called `checkpoints` within the directory where you save the app.ipynb notebook
3. Install voila if you don't have it already (`pip install voila`)
4. Run your app: `voila app.ipynb --show_tracebacks=True`
5. Customize your notebook to make your app prettier and rerun voila

You can also deploy this app as a website using Binder: https://voila.readthedocs.io/en/stable/deploy.html#deployment-on-binder

Create your submission archive

Now that you are done with your project, please run the following cell. It will generate a file containing all the code you have written, as well as the notebooks. Please submit that file to complete your project

```
!python src/create_submit_pkg.py
```

```
executing: jupyter nbconvert --to html transfer_learning.ipynb
[NbConvertApp] Converting notebook transfer_learning.ipynb to html
[NbConvertApp] WARNING | Alternative text is missing on 2 image(s).
```

```
[NbConvertApp] Writing 476676 bytes to transfer_learning.html
executing: jupyter nbconvert --to html app.ipynb
[NbConvertApp] Converting notebook app.ipynb to html
[NbConvertApp] Writing 285031 bytes to app.html
executing: jupyter nbconvert --to html cnn_from_scratch.ipynb
[NbConvertApp] Converting notebook cnn_from_scratch.ipynb to html
[NbConvertApp] WARNING | Alternative text is missing on 3 image(s).
[NbConvertApp] Writing 1776474 bytes to cnn_from_scratch.html
Adding files to submission_2023-08-22T16h56m.zip
src/model.py
src/transfer.py
src/helpers.py
src/optimization.py
src/data.py
src/train.py
src/predictor.py
src/__init__.py
src/create_submit_pkg.py
transfer_learning.ipynb
app.ipynb
cnn_from_scratch.ipynb
app.html
cnn_from_scratch.html
transfer_learning.html

-------------------------------------------------------------
Done. Please submit the file submission_2023-08-22T16h56m.zip
-------------------------------------------------------------
```