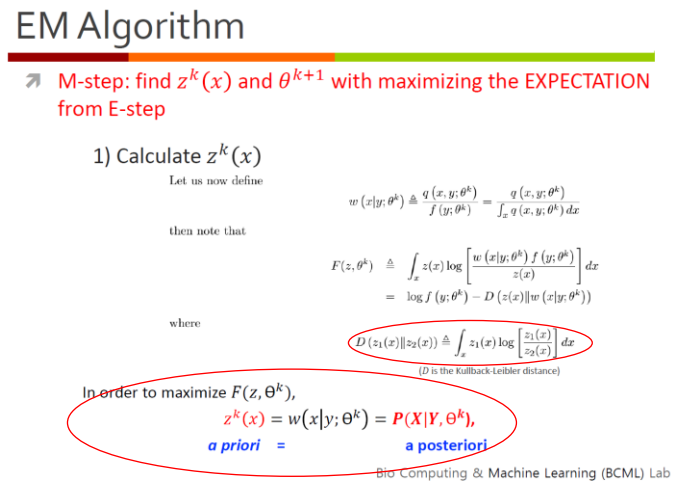
PREVIOUS HOMEWORK

- Bonus points, explain the reason based on what you learned in lecture

```
# Why are these two elements almost the same? additional 10 points
print(f'pi :              {EM_model.pi}')
print(f'count / total : {np.bincount(EM_pred) / 150}')
```

- The answer lies in online lecture and lecture note



<과제물 작성시 주의사항>

[공통]

과제물 제출시 완성된 **소스파일 및 보고서**를 반드시 **'HW_03_학번.zip'** 형식으로 압축하여 첨부합니다.

(이름 약어.py, HW_03_학번.pdf)

[소스파일] - 40점

1. 소스파일은 **.py파일만 작성**하며 반드시 문제에서 지시 또는 요구한 조건에 맞추어서 작성합니다.

(jupyter로 작성하였어도 코드를 제출 시 py파일로 작성하여 제출하여야 합니다.)

2. 각 코드마다 **반드시 주석을 달아 주셔야 합니다.** 주석을 달지 않을 경우, 부분적으로 감점이 있을 수 있습니다.

3. 결과가 올바르더라도 과정이 옳지 않을 경우, 부분적으로 감점이 있을 수 있습니다.

4. 제출한 파일이 실행되지 않을 경우, 제출한 과제물은 0점 처리됩니다.

[보고서] - 60점

1. **PDF**로 제출하며, 표지를 포함해야 합니다.

2. 보고서에는 **#1(데이터에 대한 설명과 목적), #2(네트워크 구조에 대한 설명), #3(소스 코드에 대한 설명), #4(실행 결과 + Plot), #5(참고문헌)**이 포함되어야 합니다.

3. 자신의 코드 혹은 오픈소스 코드에 대한 설명이 부족할 시 감점 당할 수 있습니다.

4. **실행 결과는 실행 결과를 캡처하여 첨부하도록 합니다.**

5. 참고문헌은 반드시 적어도 한 개 이상을 명시하여야 합니다.

CONVOLUTION NEURAL NETWORK USING TENSORFLOW

Machine learning homework-3

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CNN USING TF

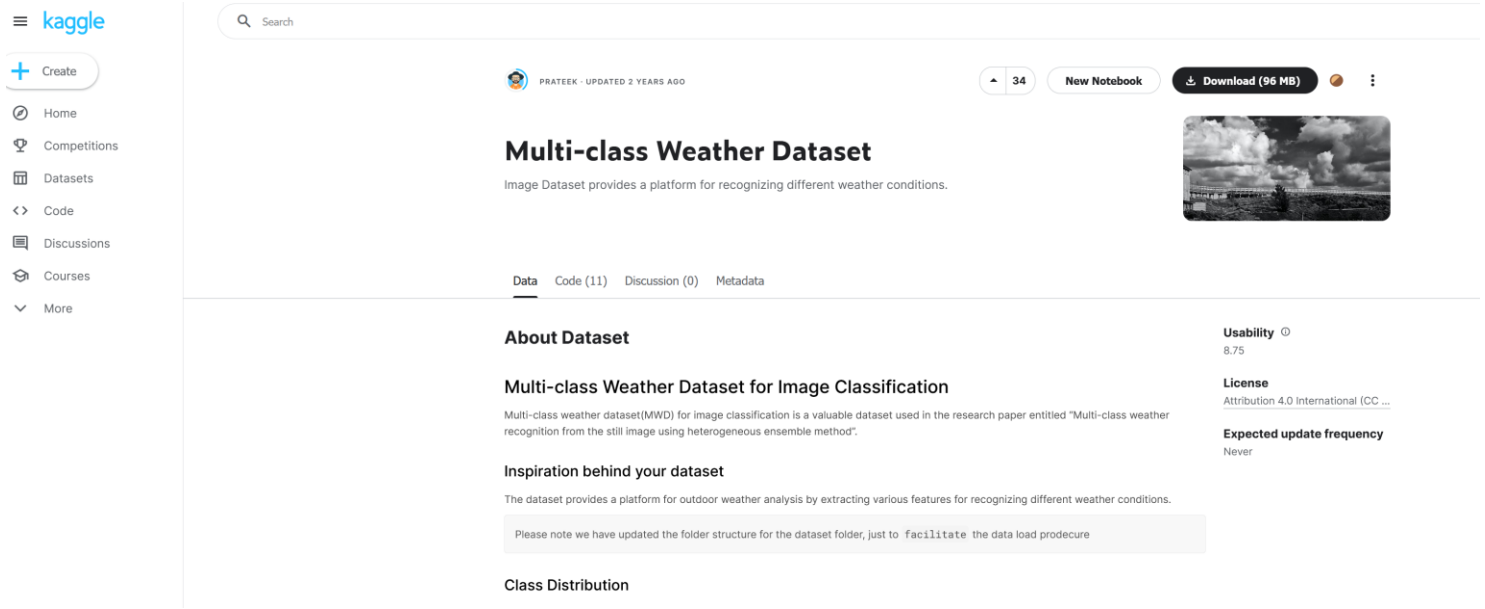
- Implementation of Convolution Neural Network Using TensorFlow

TensorFlow

- You can implement your own network or use open source (Make sure to state the source)
- All CNN-based models may be used to increase accuracy
- However, a **deep understanding** of CNN and the **progress of the code** should be shown in the report

DATASET #1

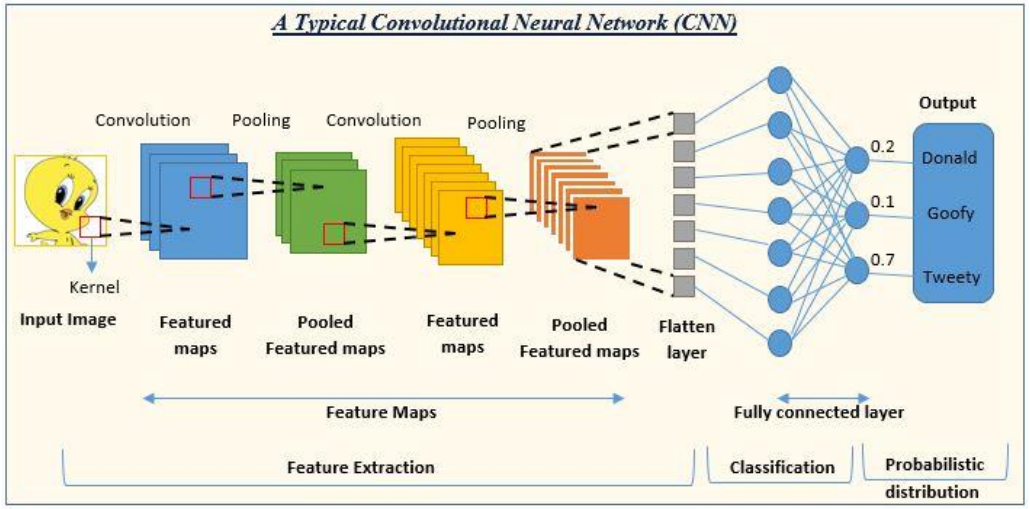
- https://www.kaggle.com/datasets/pratik2901/multiclass-weather-dataset



- Using a kaggle open dataset
- The report should state the description and objectives of the dataset.

NETWORK STRUCTURE #2

- The network structure and each layer need to be explained



Operation Layer		Number of Filters	Size of Each Filter	Stride Value	Padding Value	Size of Output Image
Input image		-	-	-	-	224 × 224 × 3
Convolution Layer (two times)	Convolution ReLU	64 -	3 × 3 × 3 -	1 × 1 -	1 × 1 -	224 × 224 × 64 224 × 224 × 64
Pooling Layer	Max pooling	1	2 × 2	2 × 2	0	112 × 112 × 64
Convolution Layer (two times)	Convolution ReLU	128 -	3 × 3 × 64 -	1 × 1 -	1 × 1 -	112 × 112 × 128 112 × 112 × 128
Pooling Layer	Max pooling	1	2 × 2	2 × 2	0	56 × 56 × 128
Convolution Layer (four times)	Convolution ReLU	256 -	3 × 3 × 128 -	1 × 1 -	1 × 1 -	56 × 56 × 256 56 × 56 × 256
Pooling Layer	Max pooling	1	2 × 2	2 × 2	0	28 × 28 × 256
Convolution Layer (four times)	Convolution ReLU	512 -	3 × 3 × 256 -	1 × 1 -	1 × 1 -	28 × 28 × 512 28 × 28 × 512
Pooling Layer	Max pooling	1	2 × 2	2 × 2	0	14 × 14 × 512
Convolution Layer (four times)	Convolution ReLU	512 -	3 × 3 × 512 -	1 × 1 -	1 × 1 -	14 × 14 × 512 14 × 14 × 512
Pooling Layer	Max pooling	1	2 × 2	2 × 2	0	7 × 7 × 512
Inner Product Layer	Fully connected ReLU	- -	- -	- -	- -	4096 4096

- You have to make structural figure and table with your hands
- Write down the selected layers and functions
- And explain how they work, **respectively**
- Conv, pool, FC layers and regularization, activation functions must be described

SOURCE CODE #3

- Open source is available but must be **explainable**

- Comments are also required and explain process of forward and back propagation
- Explain with an example how an image example is transformed when forwarding

- Describe **how and why** you chose mini-batch, epoch, loss function, optimization function, and so on

RESULTS AND PLOTS #4

- Experiment with **modifying hyperparameters** and measure accuracy
- Explain the results through a visible **plot**, such as a confusion matrix
- **Discuss why** such results came about

POINT ALLOCATION

- **Code score – 40 points**
  Quantitative evaluation
  - **40** – Top 15 accuracy model
  - **30** – Works well
  - **20** – Works
- 10 points if report description is insufficient
- Code copy is not allowed among students

- **Report score – 60 points**
  Qualitative evaluation
  - **60** – Excellent
  - **45** – Good
  - **30** – Fair
- Additionally, the score may be deducted

REFERENCES

- https://becominghuman.ai/what-are-convolutional-neural-network-cnn-d065414546a3
- https://www.analyticsvidhya.com/blog/2022/01/convolutional-neural-network-an-overview/
- https://www.researchgate.net/publication/326916041_Deep_Learning-Based_Enhanced_Presentation_Attack_Detection_for_Iris_Recognition_by_Combining_Features_from_Local_and_Global_Regions_Based_on_NIR_Camera_Sensor/figures?lo=1