Lab 3

Classification with Neural Networks

Machine Learning 2022

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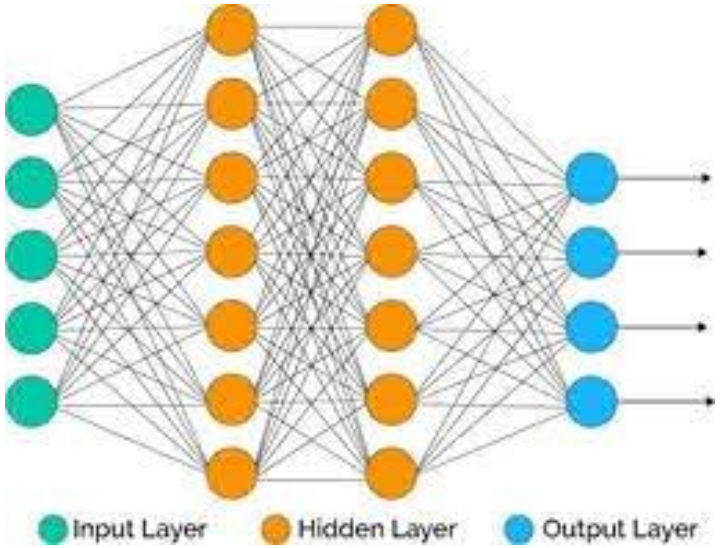
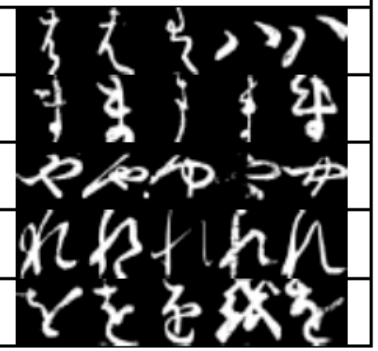
LAB3: Classification with Neural Networks



- Classify ancient cursive Japanese (Kuzushiji)writing
- Use Neural Networks (NN)

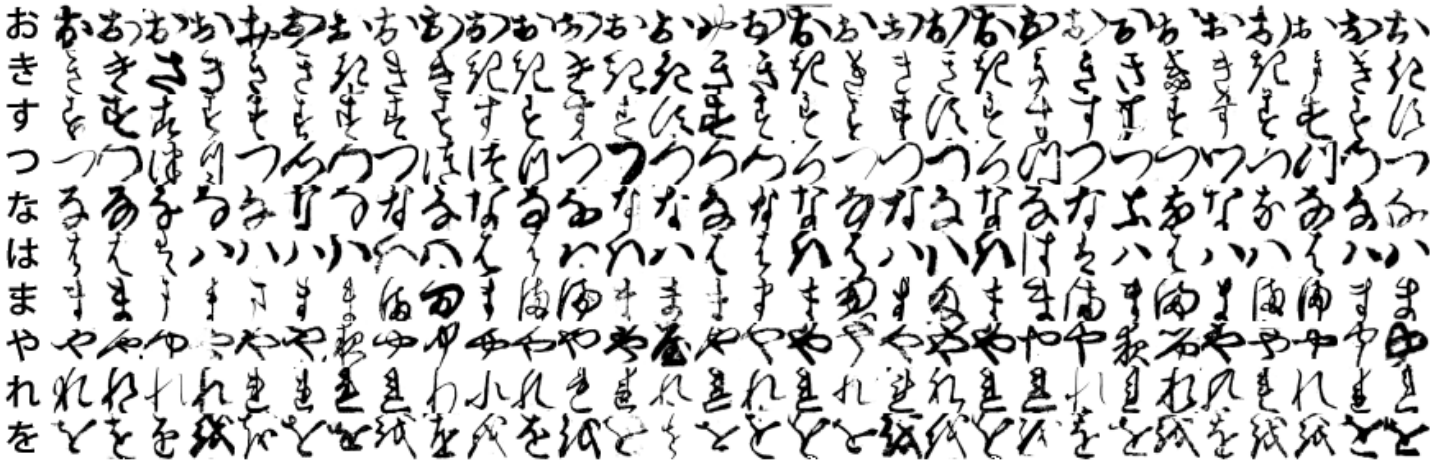
The KMNIST Dataset

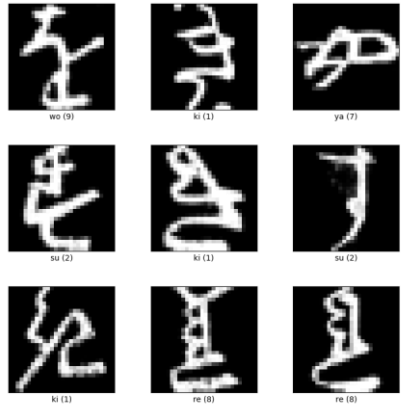
Hiragana	Unicode	Samples	Sample Images
お (o)	U+304A	7000	
き (ki)	U+304D	7000	
す (su)	U+3059	7000	
つ (tsu)	U+3064	7000	
な (na)	U+306A	7000	

Hiragana	Unicode	Samples	Sample Images
は (ha)	U+306F	7000	
ま (ma)	U+307E	7000	
や (ya)	U+3084	7000	
れ (re)	U+308C	7000	
を (wo)	U+3092	7000	

- 10 classes corresponding to 10 different characters
- 70’000 samples (7’000 for each class)
- Divided into 60’000 for training and 10’000 for testing
- Recent deep learning schemes can reach an accuracy of 99%
- For a simple NN expect an accuracy similar to SVM classification of LAB2

Classification of Japanese Characters





- Dataset of small pictures of Japanese characters: multi-class classification
- Use Neural Networks
- Try different network architectures (e.g., change number of neurons and layers)
  - Not always the largest is the best, specially if training data is limited
- See the impact of batch size and learning rate
  - From SGD to mini-batches to standard GD
  - SGD with single sample batch is very unstable
- Try with smaller or larger amount of training data
- Plot the estimated weights (can be difficult to see what you have learned)

Timeline

- Lab 3 : 14/12
- Delivery deadline: 10/1