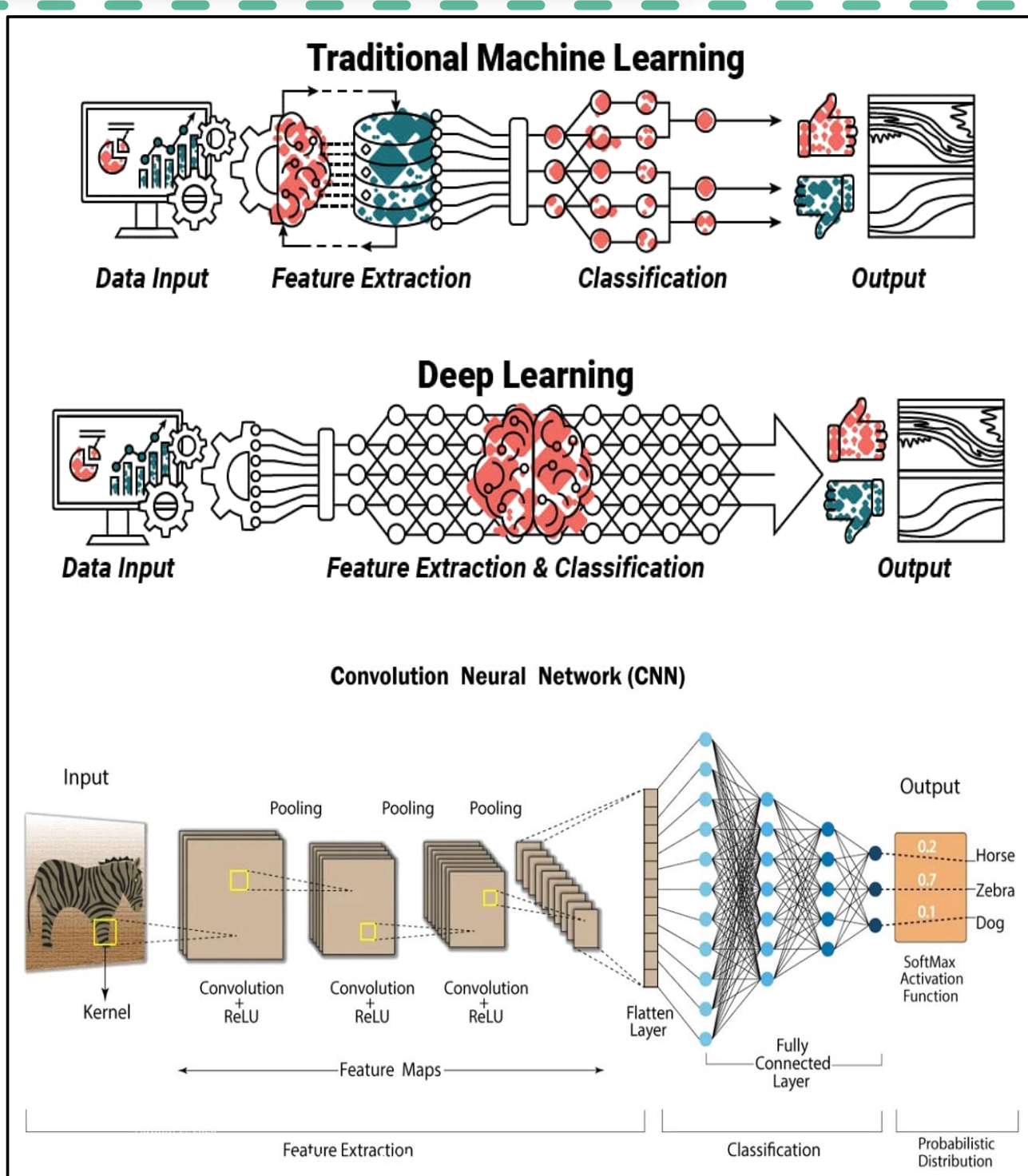


## Proof of Concept: Optimization of Genetic Algorithm-Based Deep Learning Configuration for Small-Scale Applications

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### Background



#### Ways to train a DL for application

- Design and Train Custom Network
  - Build and train a neural network from scratch
- Use Pretrained Models
  - Pretrain Models like Alexnet, Resnet50, VGG19,... can be used for re-train with our datasets
  - Large, time and energy consuming
- Fine-Tuning:
  - Use pretrained models for new task, only train few layers while keeping frozen other layers.
  - Large, time and energy consuming

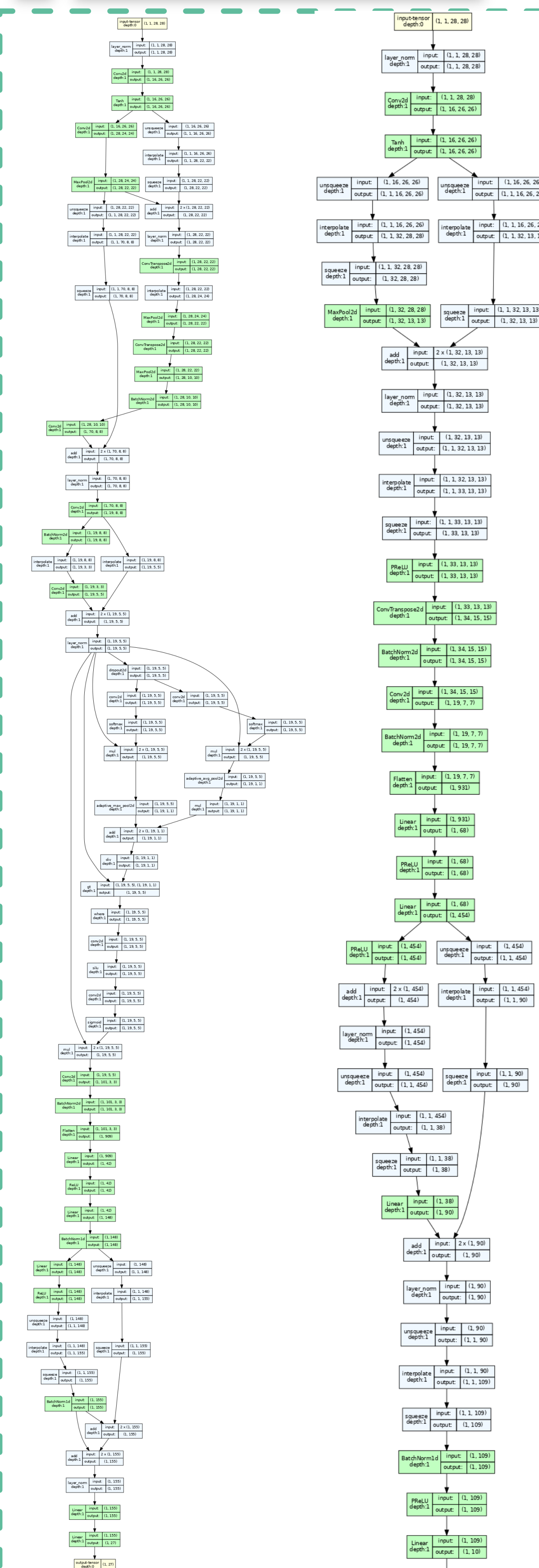
### Current Problems

The training pretrained models or design new custom DL networks will encounter some problems

- DL require knowledge during designing stage => hard to access for non-technical people or non- IT people.
- Small-scale applications have constrained resources => Large network as pretrained models sometime are not suitable (IoT)
- Designing and training models from scratch is resource-intensive and not feasible for many users.



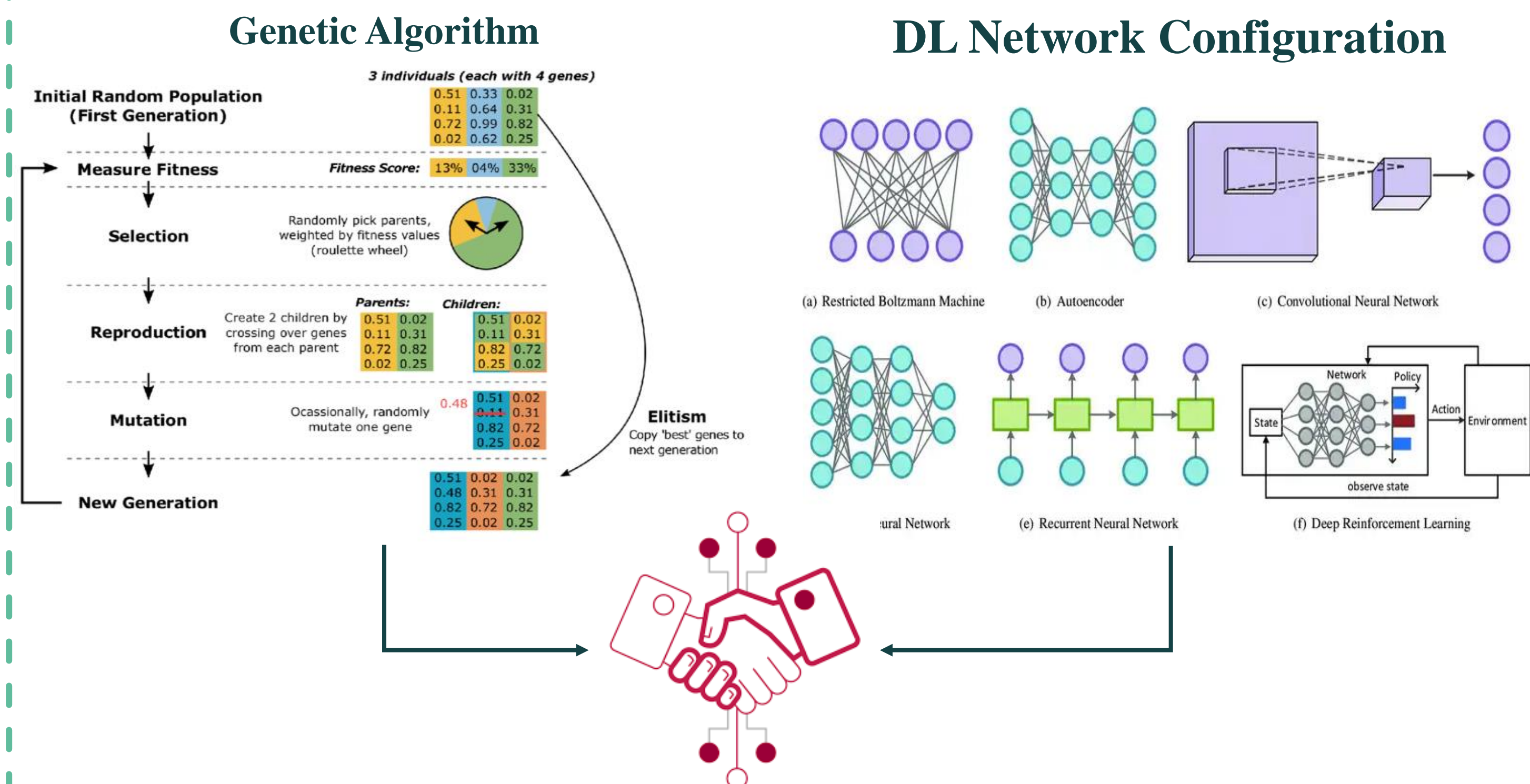
### Results



Dataset	Acc
EMNIST	
Balanced	≥ 89%
Byclass	≈86.6%
Bymerge	≈90%
Digits	≈100%
Letters	≥ 93%
MNIST	
MNIST	≈100%
FMNIST	
FMNIST	≥ 90%

Dataset	Para
EMNIST	
Balanced	≤ 150000
Byclass	≤ 150000
Bymerge	≤ 150000
Digits	≤ 50000
Letters	≤ 130000
MNIST	
MNIST	≤ 48000
FMNIST	
FMNIST	≤ 50000

### Idea



### Current Problems

