



ML Problem Statement- Amazon Forest

**Final Kaggle Accuracy - 80.4%**

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# Dataset

## Train Dataset

Number of columns in train dataset: 6751

Number of rows in train dataset: 896

Each sound is broken into 32 frequencies

## Test Dataset

Number of columns: 750

Number of row: 8672

# Initial issue

Was to load multiple excel files => converted into pkl file format

Each excel file took 2 minutes to load and hence only had to invest 20 minutes initially  
and then were able to access files within **seconds**

```
2024-04-14 09:39:20.491571: I external/local_tsl/tsl/cuda/cudart_stub.cc:32] Could not find cuda drivers on
2024-04-14 09:39:20.497004: I external/local_tsl/tsl/cuda/cudart_stub.cc:32] Could not find cuda drivers on
2024-04-14 09:39:20.583694: I tensorflow/core/platform/cpu_feature_guard.cc:210] This TensorFlow binary is
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate
2024-04-14 09:39:22.177287: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not
100%|██████████| 8400/8400 [00:00<00:00, 8719.06it/s]
(8400, 32, 250) (8400,)
```

# Ideation

Models that could be used:

1. CNN
2. LSTM
3. RNN

(Ensemble Learning)

# Data Pre-Processing

Mapping the labels:

```
label_map = {  
    1: 0, 2: 0, 3: 0, 4: 1, 5: 1, 6: 1, 7: 2, 8: 2, 9: 2,  
    10: 3, 11: 3, 12: 3, 13: 4, 14: 4, 15: 4, 16: 6, 17: 5,  
    18: 5, 19: 5, 20: 6, 21: 6, 22: 6, 23: 7, 24: 7, 25: 7,  
    26: 8, 27: 8, 28: 8  
}
```

We stored the initial files in pkl format for faster processing.

# Data Pre-Processing

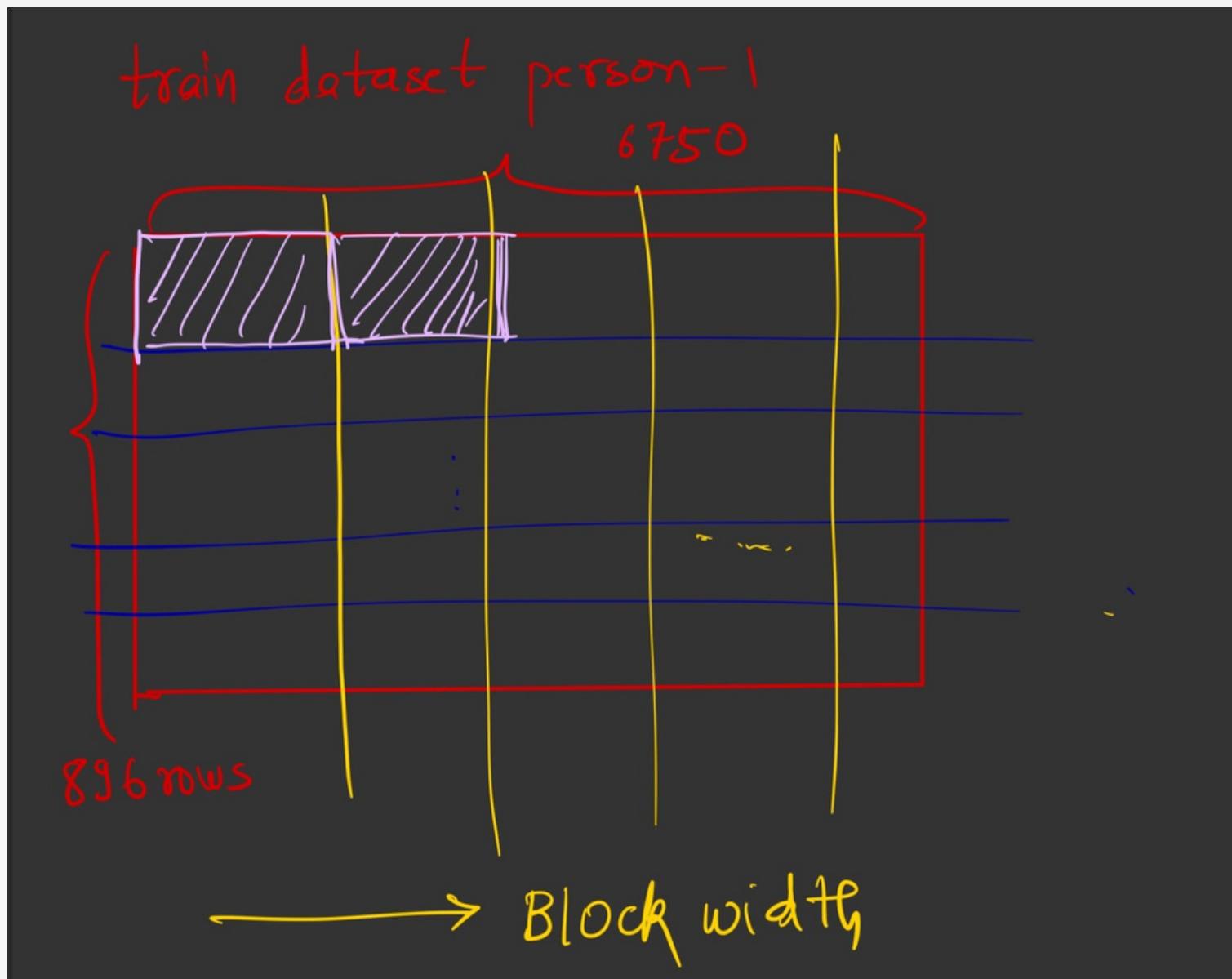
## Variables:

1. block width\*
2. stride length\*

**\*(decreasing stride length improves performance)**

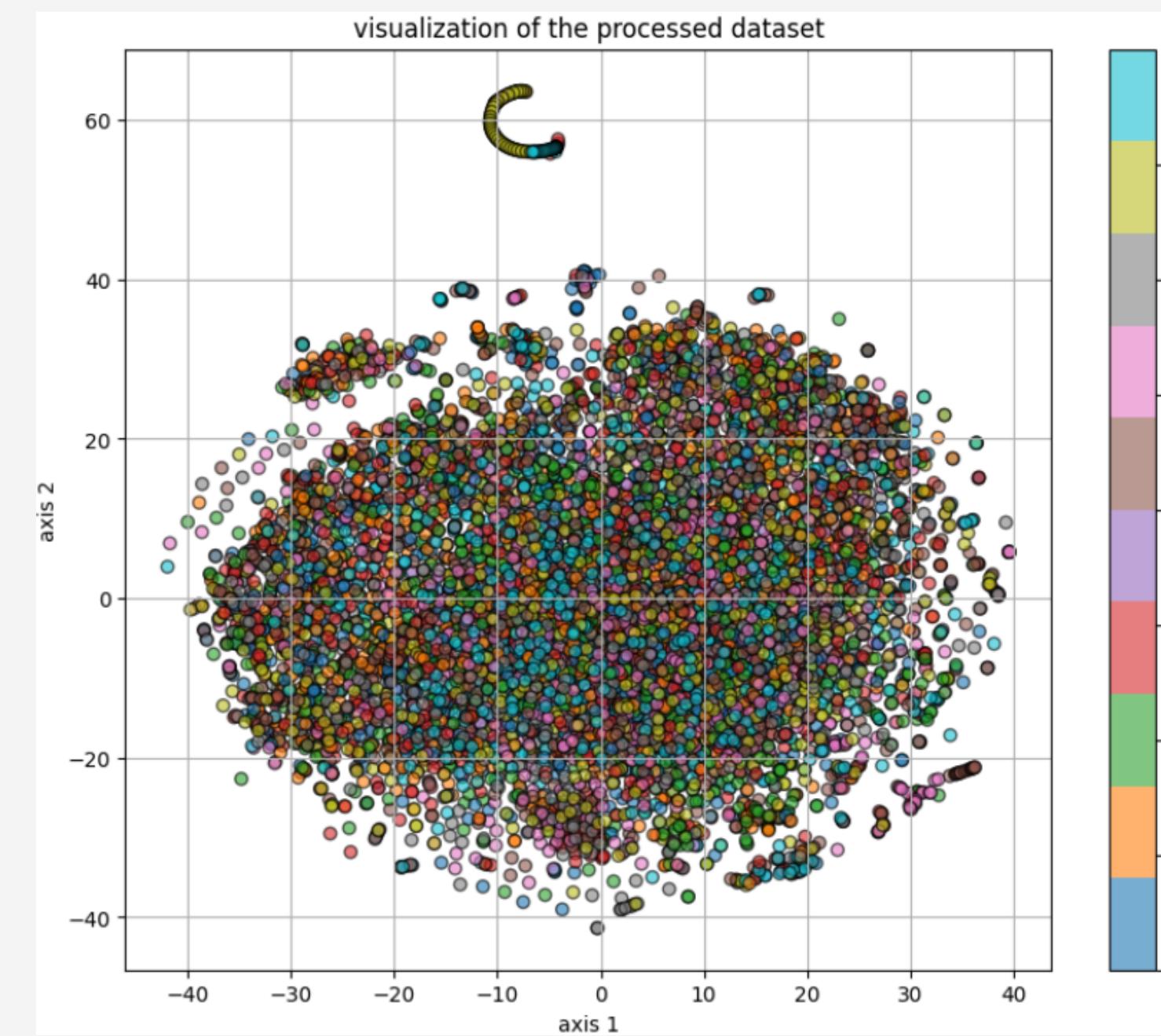
**\*(block width <750)**

# Chunking



Making dataset suitable for training

# Processed Data Visualization



# Training

Ensemble learning with 10 CNN models

```
Epoch 1, Loss: 2.2036166320222734, Validation Accuracy: 20.997536945812808%
Saved better model at epoch 1 with validation accuracy: 20.997536945812808%.
Epoch 2, Loss: 2.0586286523670805, Validation Accuracy: 27.68199233716475%
Saved better model at epoch 2 with validation accuracy: 27.68199233716475%.
Epoch 3, Loss: 1.6360833822246192, Validation Accuracy: 53.99562123700055%
Saved better model at epoch 3 with validation accuracy: 53.99562123700055%.
Epoch 4, Loss: 0.9584037156804125, Validation Accuracy: 72.45484400656814%
Saved better model at epoch 4 with validation accuracy: 72.45484400656814%.
Epoch 5, Loss: 0.5507790184614434, Validation Accuracy: 81.1576354679803%
Saved better model at epoch 5 with validation accuracy: 81.1576354679803%.
```

Used Majority Voting in Testing

Test Accuracy: 80.40 %

# Ensemble Learning

Ensemble learning with 10 CNN models

- We trained 10 different models for the 10 persons.
- We did a majority voting among the models to predict.

# Trials

Type of Model	Stride	CNN Layers	Epochs	Validation score (%)	Kaggle Score (%)
LSTM	-	-	20	16.07	16
CNN	25	3	20	67	66.40
Ensemble Learning	25	3	20	81	80.40

# Thank You!