ANN Regression:

Dataset Description:

Dataset: Stock Market

No. of Samples: 5804

Features: Date, Low, Open, Volume, High, Close

Target Column: 'Adjusted Close' having continuous prices values

Model Details:

Input layer: 6 units

Hidden Layer: 7 layers, units: [256,128,64,32,16,8,4]

Loss Function: MSELoss(reduction='mean')

Optimizer: Adam(lr=0.01)

Training Configurations:

Learning Rate=0.1

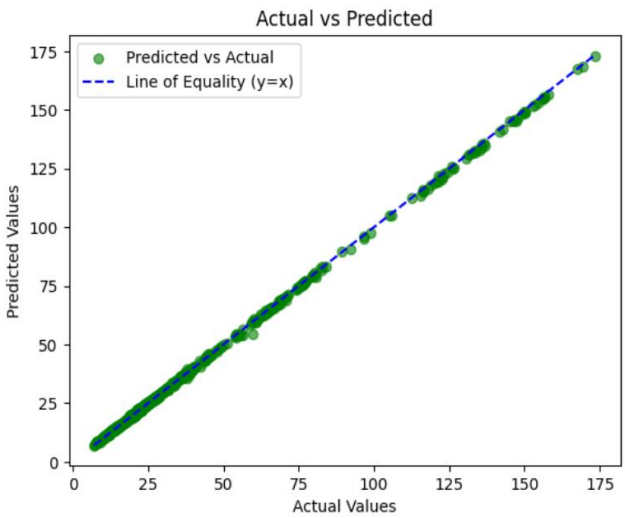
Batch Size=128

No. Of Epochs=100

Performance Metrics:

```
MSE:  0.4569
MAE:  0.4856
```

Graphs:



ANN Classification:

Dataset Description:

Dataset : Cifar10

No. of samples: 60000

No. of target classes: 10,

target_names= ["Airplane", "Automobile", "Bird", "Cat", "Deer", "Dog" "Frog", "Horse", "Ship", "Truck"]

Model Details:

Input layer: 3 * 32 * 32 units

Hidden Layer: 5 layers, units: [512, 256, 128, 64, 32]

output layer = 10 units

Loss Function: MSELoss(reduction='mean')

Optimizer: Adam(lr=0.001)

Training Configurations:

Learning Rate=0.001

Batch Size=1000

No. Of Epochs=100

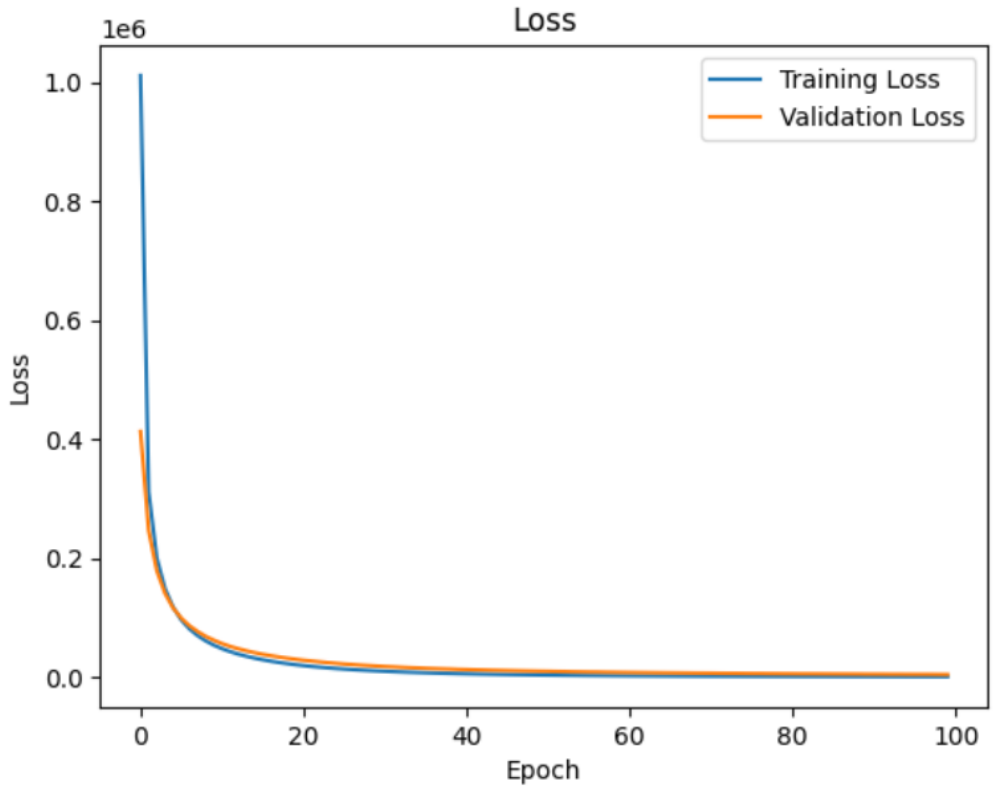
Performance Metrics:

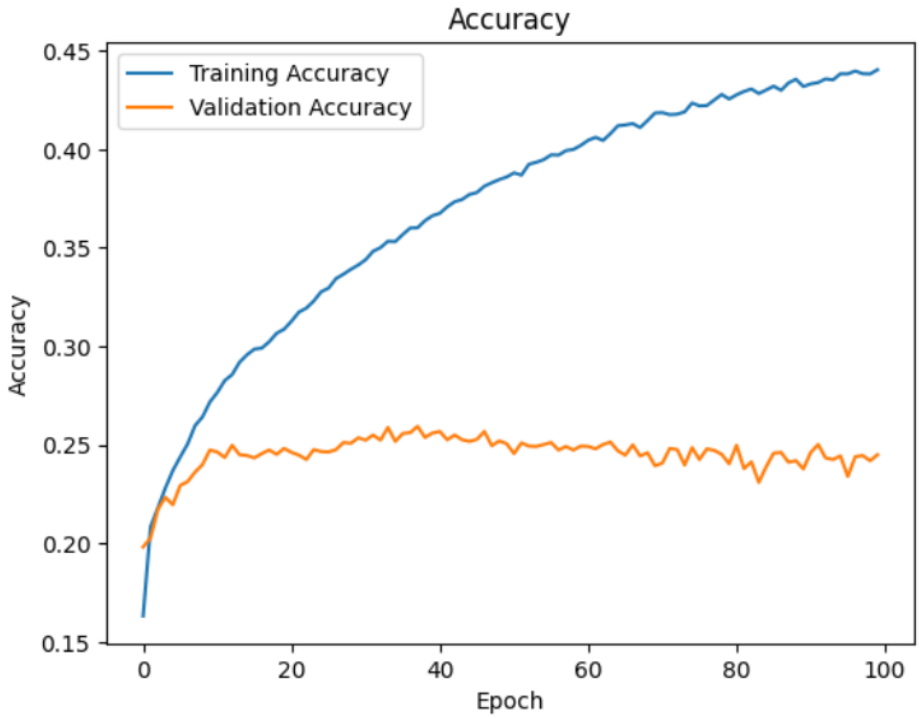
Accuracy = 24.5%

```
Confusion Matrix:
[[201  33  39  29  17  30  14  15  86  16]
 [ 39 156  37  27  25  32  16  37  79  52]
 [ 56  27  78  51  55  53  67  45  30  17]
 [ 30  35  42  84  41  95  80  43  33  28]
 [ 35  34  87  46  74  72  82  38  27  18]
 [ 29  29  57  99  45 106  58  40  26  26]
 [ 20  27  89  73  37  56 116  35  12  16]
 [ 33  49  46  74  53  49  35  84  37  39]
 [ 82  52  27  29   9  17  11  20 235  31]
 [ 42 108  35  38  21  45  14  38  77  91]]
```

```
Classification Report:

              precision    recall  f1-score   support

    Airplane       0.35      0.42      0.38       480
  Automobile       0.28      0.31      0.30       500
        Bird       0.15      0.16      0.15       479
         Cat       0.15      0.16      0.16       511
        Deer       0.20      0.14      0.17       513
         Dog       0.19      0.21      0.20       515
        Frog       0.24      0.24      0.24       481
       Horse       0.21      0.17      0.19       499
        Ship       0.37      0.46      0.41       513
       Truck       0.27      0.18      0.22       509

    accuracy                           0.24      5000
   macro avg       0.24      0.25      0.24      5000
weighted avg       0.24      0.24      0.24      5000
```

Graphs:


Loss
1e6
1.0
0.8
0.6
0.4
0.2
0.0
Loss
Training Loss
Validation Loss
0
20
40
60
80
100
Epoch


Accuracy
0.45
0.40
0.35
0.30
0.25
0.20
0.15
Accuracy
Training Accuracy
Validation Accuracy
0
20
40
60
80
100
Epoch

ANN Regression:

Dataset Description:

Dataset: Cifar10

No. of samples: 60000

No. of target classes: 10,

target_names= ["Airplane", "Automobile", "Bird", "Cat", "Deer", "Dog" "Frog", "Horse", "Ship", "Truck"]

Model Details:

Input layer: 3 * 32 * 32 units

Conv2D: 96 filters, shape (3,3)

MaxPooling2D (2,2)

Flatten ()

Dense Layer: 28 units, activation function: relu

Dense Layer: 10 units, activation function: softmax

Loss Function: sparse_categorical_crossentropy

Optimizer: Adam(lr=0.001)

Training Configurations:

Learning Rate=0.001

Batch Size=32

No. Of Epochs=10

Performance Metrics:

Accuracy = 69.7%

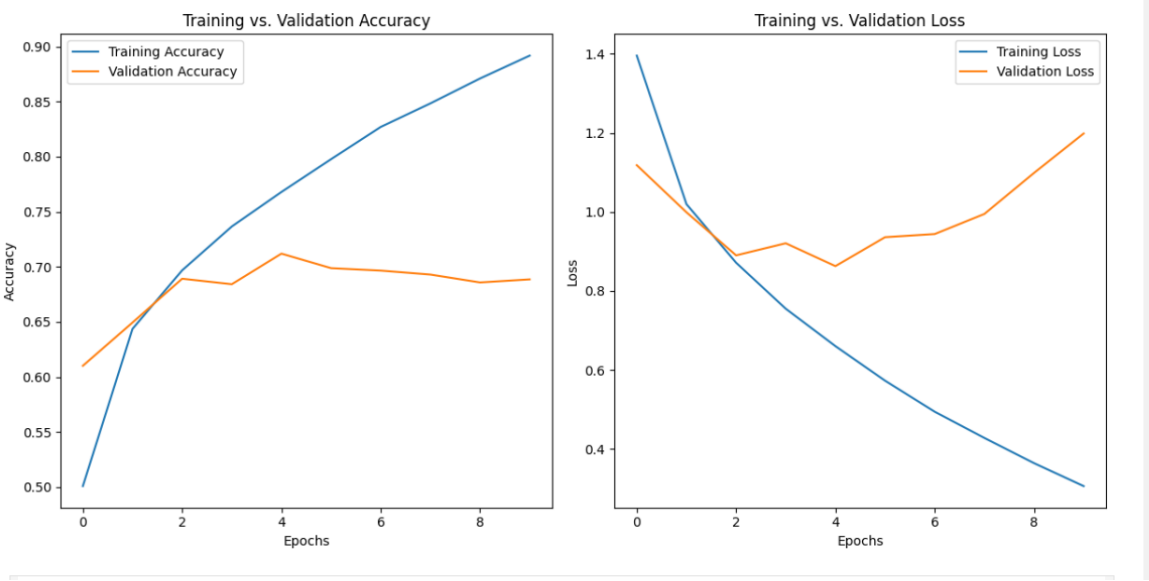
Confusion matrix:

```
[[422  11  26   0   1   5   4   4  33  15]
 [ 18 416   4   2   0   2   1   0  23  48]
 [ 37   6 306  15  32  15  25  16  14   9]
 [ 31   8  53 200  34  79  28  29  23  15]
 [ 24   0  59  22 325   6  16  29   8   5]
 [ 24   8  69  79  20 269   6  26  17   4]
 [ 13   8  39  27  20  11 357   4   7   3]
 [ 18   5  35   8  26  12   2 356   3   7]
 [ 37  15   7   0   2   1   0   3 430  16]
 [ 20  42   3   2   3   0   0   6  22 404]]
```

Classification Report:

	precision	recall	f1-score	support
Airplane	0.66	0.81	0.72	521
Automobile	0.80	0.81	0.81	514
Bird	0.51	0.64	0.57	475
Cat	0.56	0.40	0.47	500
Deer	0.70	0.66	0.68	494
Dog	0.67	0.52	0.58	522
Frog	0.81	0.73	0.77	489
Horse	0.75	0.75	0.75	472
Ship	0.74	0.84	0.79	511
Truck	0.77	0.80	0.79	502
accuracy			0.70	5000
macro avg	0.70	0.70	0.69	5000
weighted avg	0.70	0.70	0.69	5000

Graphs:



Comparative Table:

Model	Dataset / Task	Key Hyperparams	Final Metric	Training Time
PyTorch ANN (Reg)	Stock Market	LR=0.01, Epoch=100	MSE = 0.45; MAE = 0.48	~15 min
PyTorch ANN (Class)	CIFAR-10	LR=0.001, Epoch=100	Accuracy = 24.5%	~30 min
Keras CNN (Class)	CIFAR-10	LR=0.001, Epoch=10	Accuracy = 69.7%	~6h 45 min