Handwritten Digit Recognition Write Up

Inorder to classify handwritten digits, I used **Support Vector Machines (SVM).** I explored two classical machine learning algorithms, the other being **K- Nearest Neighbors (KNN)** since Deep Nets was not allowed. Out of the two, I opted for SVM, since KNN makes the assumption that similar points share similar labels. The nearest neighbor works by "memorising" the training data and also KNN is meant for the curse of dimensionality (features become sparse for increasing number of dimensions).

On the other hand, svm finds a hyperplane in an n-dimensional space that separates data points to their classes. I first tried the GridSearch method to search for the best hyperparameters and train the model using those parameters. But, it took a lot of time to search for those parameters, so I opted for a linear kernel with auto gamma values and trained the model.

Using traditional machine learning, all the features need to be extracted. This makes the task difficult if the number of labels increases. So, I would try some deep networks with a pre-trained model. Deep Networks are more effective as important features are automatically extracted which makes our model more robust.

I have worked on several tasks in computer vision like image classification, object detection, image segmentation and Optical Character Recognition. Besides this, I also have knowledge in Natural Language Processing and have hands-on knowledge in libraries like Spacy, Transformers.

Deployment Steps:
I have used FastAPI to create an endpoint for the inference. Deployment is done in heroku as it provides free services to host the model.
The model is hosted at: https://digit-classifer.herokuapp.com/docs

Image used for the test:

Prediction: label 4 has got more probability percentage with 44.288%

Request URL

https://digit-classifer.herokuapp.com/api/predict

Server response

Code	Details
200	Response body

```
{
  "result": [
    {
      "label": "0",
      "probability": 0.307
    },
    {
      "label": "1",
      "probability": 0.507
    },
    {
      "label": "2",
      "probability": 14.629
    },
    {
      "label": "3",
      "probability": 0.83
    },
    {
      "label": "4",
      "probability": 44.288
    },
    {
      "label": "5",
      "probability": 1.761
    },
    {
      "label": "6",
```

Response headers