CS523 Computer Vision
Report

Sudoku Digit Recognition and Classification

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Introduction

This report explains the implementation details of CS523 Computer Vision Assignment 2, which is about Principal Component Analysis(PCA) and its classification on MNIST dataset.

The pre-processing of the given image will be explained first and will be followed by the logic behind the rectangle extraction. Lastly, I will add my findings and comments. To run the code, there needs to be a directory which contains the .jpg files. The directory and main.py needs to be at the same level.

About Principal Component Analysis

Principal Component Analysis(PCA) is an algorithm used for dimensionality reduction. In the MNIST dataset, each image comes as vectors of dimension 784. However, not all this dimensions contain relevant information for classifying.

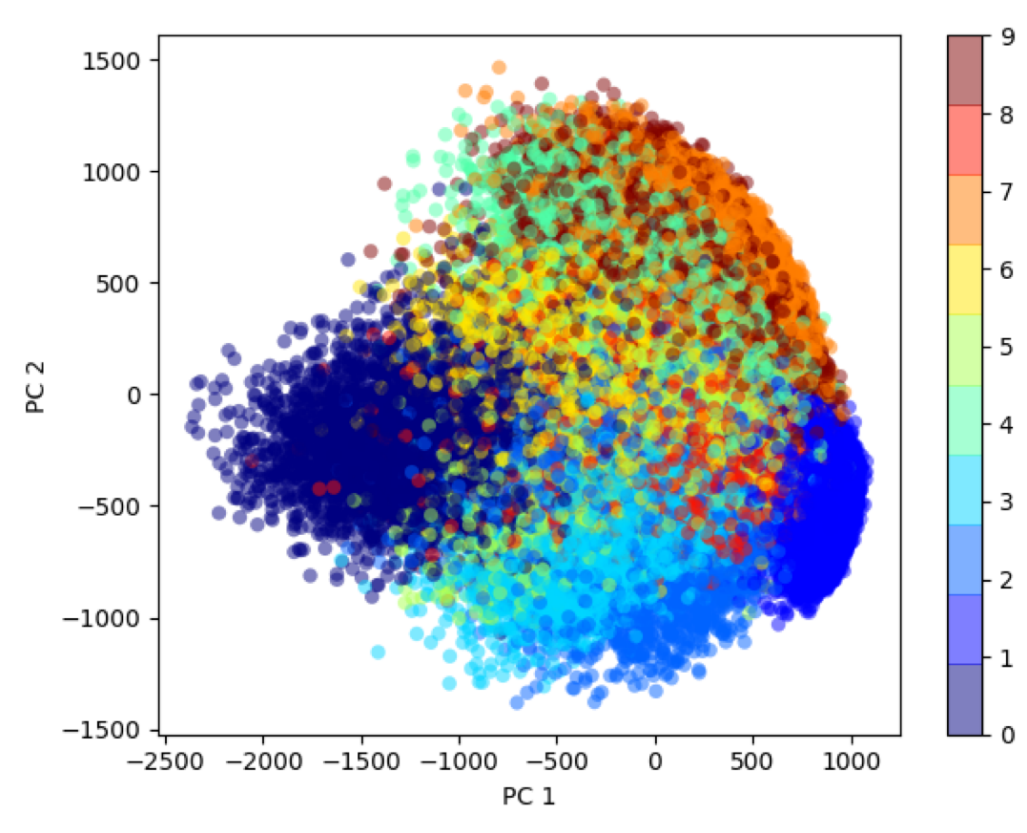

Figure 0.1: PCA results

About k-Nearest Neighbor Algorithm

Results

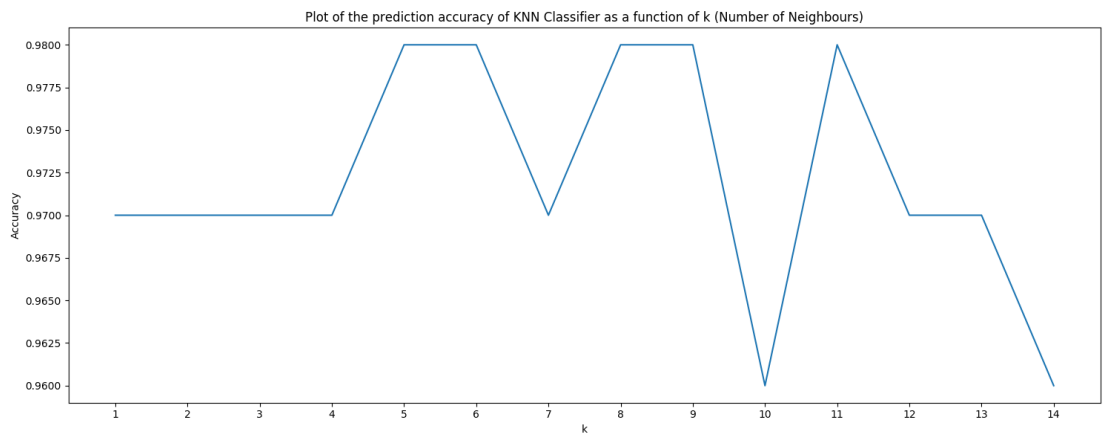

Figure 0.2: k-Nearest Neighbor accuracy results

Predicted	0	1	2	3	4	5	6	7	8	9	All
Actual											
0	966	1	2	1	0	2	5	1	2	0	980
1	0	1128	3	1	0	0	2	0	1	0	1135
2	5	2	994	3	0	2	3	16	7	0	1032
3	0	2	3	956	0	18	0	11	17	3	1010
4	0	0	0	0	938	1	7	3	1	32	982
5	4	1	3	16	1	849	8	2	5	3	892
6	6	3	1	0	2	4	941	1	0	0	958
7	0	17	9	1	6	0	1	966	1	27	1028
8	3	0	2	16	4	13	6	4	919	7	974
9	3	5	2	10	17	4	1	6	7	954	1009
All	987	1159	1019	1004	968	893	974	1010	960	1026	10000

Confusion Matrix of kNN classifier
Accuracy: 96.11%

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Bibliography

[1] Reginald Watson. Grid detection with opencv on raspberry pi: Raspberry pi, Apr 2020.