

Contents

| | | |
|----------|--|-----------|
| 1 | Introduction | 5 |
| 1.1 | Gestures | 5 |
| 1.2 | Sign language | 6 |
| 1.3 | Objective and Over view of system | 6 |
| 1.4 | Report Outline | 7 |
| 2 | Preprocessing | 8 |
| 2.1 | Introduction | 8 |
| 2.2 | Segmentation | 8 |
| 2.3 | Morphological filtering | 10 |
| 2.3.1 | Dilation | 10 |
| 2.3.2 | Erosion | 10 |
| 2.3.3 | Opening | 11 |
| 2.3.4 | Closing | 11 |
| 3 | Review of related work | 12 |
| 3.1 | Sign language | 12 |
| 3.2 | Sign language classification | 12 |
| 3.3 | Classification using Image moments | 13 |
| 4 | Theory of moments | 14 |
| 4.1 | General theory of image moments | 14 |
| 4.1.1 | Geometric Moments | 15 |
| 4.1.2 | Complex Moments | 15 |
| 4.1.3 | Orthogonal Moments | 15 |
| 4.2 | Rotational invariants moments | 16 |
| 4.2.1 | Hu invariants equation | 16 |
| 4.2.2 | Zernike Moments | 18 |
| 4.2.3 | Krawtchouk moments | 20 |
| 4.3 | Support vector machine (SVM) | 22 |
| 4.3.1 | Formal definition | 22 |
| 4.3.2 | Mathematical theory | 23 |
| 4.3.3 | Properties | 25 |
| 4.3.4 | Type and Use | 25 |
| 5 | Our approach | 26 |
| 5.1 | Preprocessing | 26 |
| 5.2 | Feature Extraction | 26 |
| 5.3 | Classification | 27 |

| | | |
|----------|-----------------------------------|-----------|
| 6 | Result | 28 |
| 6.1 | Database description | 28 |
| 6.2 | Implementation | 28 |
| 7 | Conclusion and Future work | 37 |
| 7.1 | Conclusion | 37 |
| 7.2 | Future Works | 37 |

List of Tables

| | |
|---|----|
| 6.1 comparison between Zernike and Krawtchouk | 35 |
|---|----|

List of Figures

| | | |
|-----|---|----|
| 1.1 | Block digram | 7 |
| 4.1 | Choosing the hyperplane that maximizes the margin. | 24 |
| 6.1 | Gesture Symbols | 28 |
| 6.2 | Result after Segmentation and morphological operation | 29 |
| 6.3 | Hu accuracy result | 30 |
| 6.4 | Accuracy 2D color map for zernike | 31 |
| 6.5 | Accuracy 2D color map for zernike | 32 |
| 6.6 | Accuracy 2D color map for krawtchouk | 33 |
| 6.7 | Accuray 2D color map for krawtchouk | 34 |
| 6.8 | Compare Zernike and Krawtchouk result upto order 30 | 36 |
| 6.9 | Highest recognition accuracy of Hu, Zernike, krawtchouk | 36 |