## List of figures

1.1 Some of the major defects in fabric 4

1.2 Block diagram of fabric automated visual inspection (FAVI) system 8

2.1 Synthetically generated fabric images, actual fabric images and their SVD plots up to 10 singular numbers 34

2.2 Split scale image partitioning technique (a) multiple iterations of splitting at split scale 2 and (b) single iteration of splitting at split scale 2. 37

2.3(a) Plot of average normalized singular values for different sub image size 40

2.3(b) Plot of number of positive average normalized singular values against dimensions of square image 41

2.4 Images of test results 45

3.1 Artificially fabricated fabric images belonging to different fabric classes and their mean image 52

3.2 Plot of sum singular values and reconstructed sum singular values along with the respective normalized values against the singular numbers for the reconstructed fabric images 58

3.3 A few woven fabric samples from different fabric classes 67

3.4 A few sub images of fine fabric class, used for training 67

3.5 Images of test results 70

4.1 Plot of average energy, average entropy, average contrast, average variance, average homogeneity, average correlation of synthetically generated fabric image 80

4.2 Plot of training and test errors for the 5-fold cross validation method, required for neighborhood selection of KNN 90
4.3 Plot of optimum projected values of test fabric samples of different fabric classes (a) in non optimized Haralick space, (b) in optimized Haralick space

5.1 Gray scale dilation of fabric image

5.2 Gray scale erosion of fabric image

5.3 Gray scale opening

5.4 Gray scale closing

5.5 De-noising by morphological opening and closing operation

5.6 Morphological reconstruction operation where marker is obtained by horizontal structuring element

5.7 Morphological reconstruction operation where marker is obtained by vertical structuring element

5.8 Block diagram of the process during test phase for the detection of defects in plain woven fabric

5.9 Test results of detection of various defects in the woven fabric

5.10 Detection of multiple defects in a single test sample

5.11 Typical case of defect detection with angular warp-weft structure

6.1 3D fabric image

6.2 2D band pass filtering of artificially fabricated fabric images for defect detection.

6.3 3D cylindrical filter

6.4 3D band pass filtering of artificially fabricated fabric images for defect detection

6.5 Template images

6.6 Test results for first fabric class

6.7 Test result for second fabric class

6.8 Test result for third fabric class
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.9</td>
<td>Test result for fourth fabric class</td>
<td>138</td>
</tr>
<tr>
<td>6.10</td>
<td>Test result for fifth fabric class</td>
<td>139</td>
</tr>
<tr>
<td>6.11</td>
<td>Test result for multiple fabric defects</td>
<td>140</td>
</tr>
<tr>
<td>6.12</td>
<td>Test result for very fine fabric defect</td>
<td>141</td>
</tr>
<tr>
<td>6.13</td>
<td>Original fabric image and partitioned fabric image</td>
<td>142</td>
</tr>
<tr>
<td>6.14</td>
<td>Partitioned sub images</td>
<td>142</td>
</tr>
<tr>
<td>6.15</td>
<td>Partitioned sub images after cylindrical filtering of suitable radius</td>
<td>143</td>
</tr>
<tr>
<td>6.16</td>
<td>Partitioned sub images after suitable energy thresholding</td>
<td>143</td>
</tr>
<tr>
<td>6.17</td>
<td>Accumulation of thresholded reconstructed fabric frames</td>
<td>144</td>
</tr>
<tr>
<td>6.18</td>
<td>Plot of ratio of second time factor to the first against the single</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>dimension of square fabric subimage</td>
<td></td>
</tr>
</tbody>
</table>