

Figure 4.12: (a) Two dimensional r-b histogram of pine board p8.dat in Figure 4.2(a), (b) Contour plot of the r-b histogram

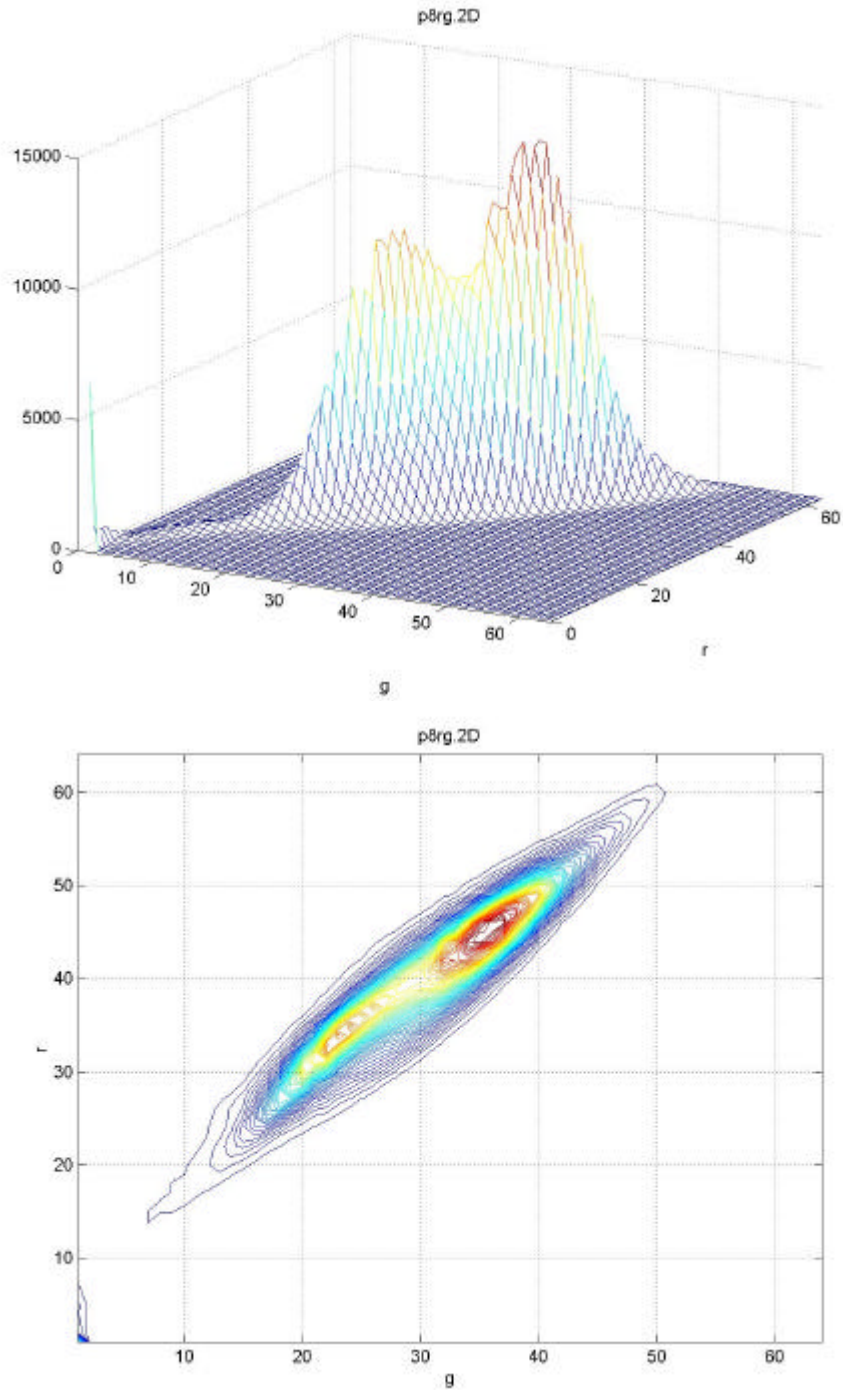


Figure 4.12: (c) Two dimensional r-g histogram of pine board p8.dat in Figure 4.2(a), (d)  
Contour plot of the r-g histogram

The 2-dimensional histograms of the yellow poplar board in Figure 4.4(a) are shown in Figures 4.13. The r-b and r-g histograms shown have several sharp peaks which is also evident in the contour plots. This explains the observed results of segmentation summarized in Table 4.2. When the threshold is set very low, only the stray noise is picked up as explained in Section 4.2. As the threshold is raised, the multiple clusters appear due to the presence of sharp spikes in the histogram.

However, in all the boards, the dark colored defects are generally located. A careful glance at the two dimensional histograms of the pine, oak and yellow poplar boards will indicate that the dark colored defects appear very near the origin, and is very well separated from the main cluster. It is thus easy to segment these regions into a separate cluster. On the other hand, the heartwood and sapwood clusters of the yellow poplar board are close to each other in the color space. In the pine boards, the color of the grain pattern is different from the color of the earlywood region.

Since the two have a significant amount of difference in color, the grain pattern is segmented out as a defect, (Figure 4.2d) when the other features are detected.

It has been seen that due to the presence of noise a lot of sharp peaks and discontinuities are being generated in the histogram. This violates the basic assumption of the algorithm that peaks in the data set correspond to cluster centers. If it is possible to eliminate the noise content, then the false peaks (peaks in the histogram which do not correspond to any distinct feature on the board) could be minimized. This implies that the basic assumption of the algorithm that the peaks in the histogram correspond to a distinct cluster will be valid, which in turn should improve the results of the segmentation process. The result of filtering the histograms in an attempt to minimize the occurrence of false peaks in the histograms will now be described.