Soccer player segmentation

Overview of the procedure:

- Extract ground and players from the rest of the image (Remove the audience)
- Extract player blobs (rough regions) from the ground and players image we got from the above step.
- Get image edges from image gradient.
- Add the image blobs and image gradient together to get a sum image. (this one a few unwanted lines as well which we will remove in the later steps)
- Remove thin lines and other small unwanted features from this sum image.
- Consider regions of the image and remove regions which don't satisfy a certain number of criteria.
- Convert the player regions into boundaries and add these to the original image in red color to get the final image with players detected.

Steps in detail:

1. To extract the ground and the players from the rest of the image I blurred the image heavily initially so that all the players etc disappear and only the ground remains in a shade of green and the audience remain in some other shade generally. Now I just keep the green regions of the image using the condition "g>r>b" for each pixel and the ones which satisfy the condition are the ground whereas the others are removed. I also do a morphological opening so that we have the entire ground present.
2. Using the same condition above, I now apply this on the original image(not the blurred one), so that I can extract the player blobs from the ground.
3. I apply a prewitt filter and extract edges from the image which would give me the finer details of players and other objects that might be required since the blobs might have missed them.
4. I sum the two images up to get a sum image. Now this image would also have unwanted lines like the markings on the football ground, a few details on the banners etc which would be removed in the next step.
5. The thin lines on the field etc are removed by using morphological erosion and dilation. In this manner we keep the players but remove all the other unwanted details.
6. Now I iterate over the connected components of the image removing ones whose area is either too small or too large. I also remove objects whose area <= 3*perimeter since these would generally be lines or banners which we don't want to capture. Players generally have a decent (>3) area to perimeter ratio.
7. Apply a morphological dilation and subtract the morphological erosion from this to get a boundary which I add to the original image in red color. This would give us the final image with red boundaries around the football players.