1 Short answer questions

1(a) More points will be selected as features in the same region, because we only require local maximal in scale-space but not in position-space, which will affect distinctiveness. However, it won't have a significant influence on repeatability because local maximal in scale-space will generally remain as local maximal after the transformation.
(b)This method will definitely affect repeatability but its influence on distinctiveness depends on the threshold.

2 Inliers are those points that can approximately form a line while minimizing the epipolar constraints because with uncalibrated views not all the epipolar lines intersect at the same point. We can compute inliers using the seven points algorithm because of the seven degrees of freedom of F.

3
(a) The reflection of light of the object might be different in different directions.
(b) We may have a scan line end up in areas lack of texture.

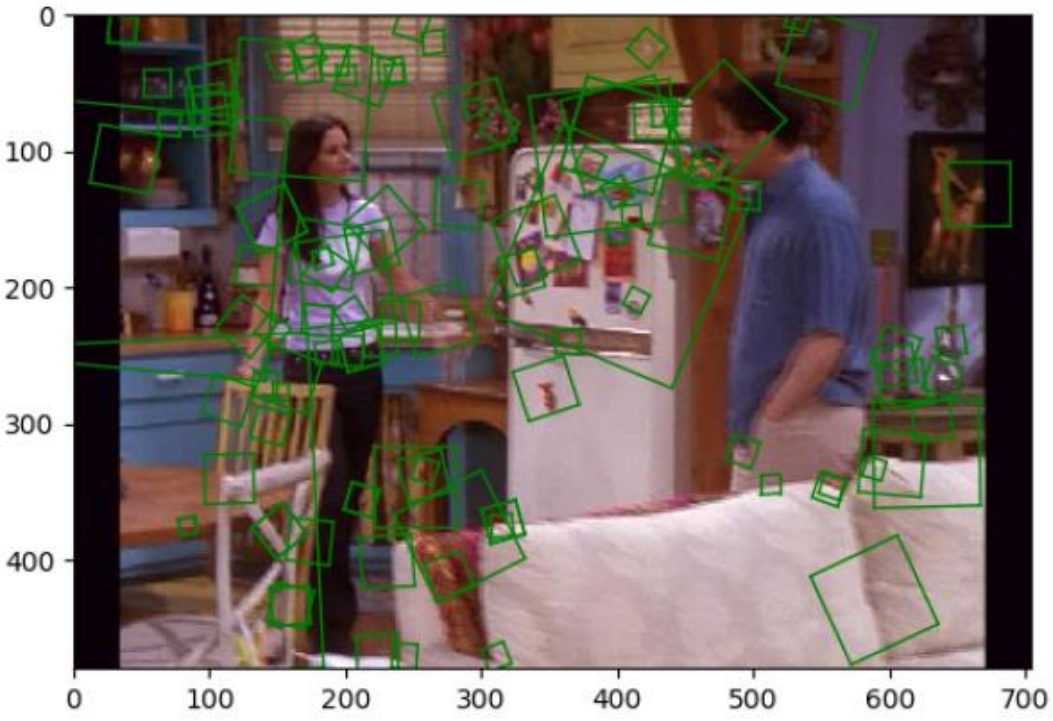
4
The intensity which is calibrated by the dominant gradient orientation in a certain direction.

5
4 dimensions. 2 dimensions for location, 1 for orientation and 1 for scale.

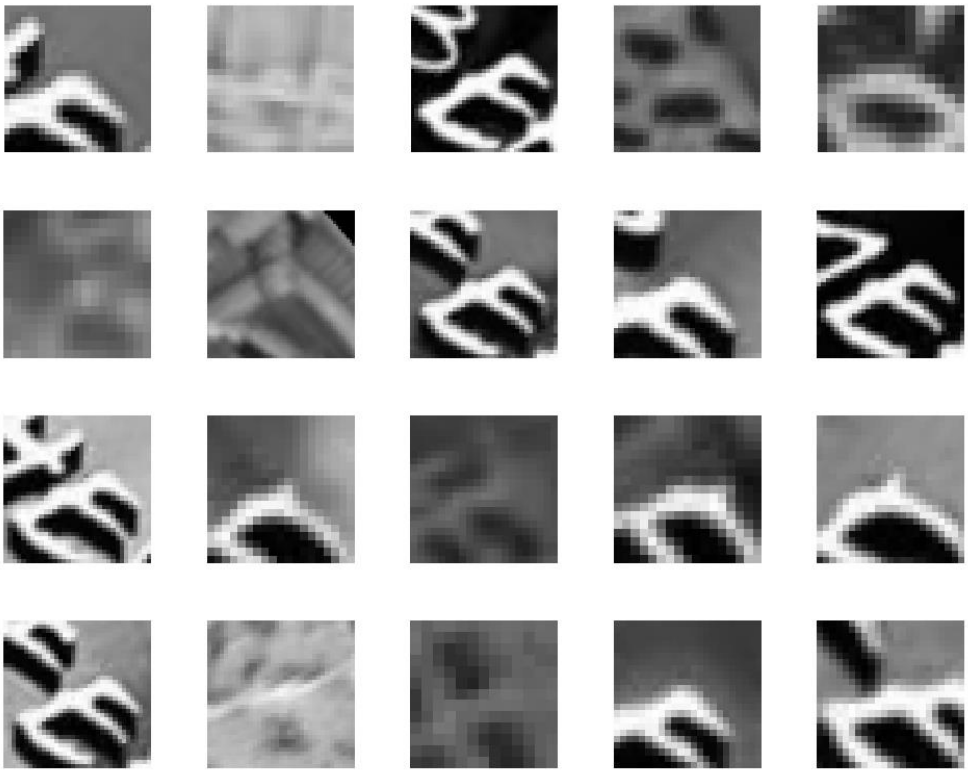
2 Programming problems

1 Selected region:

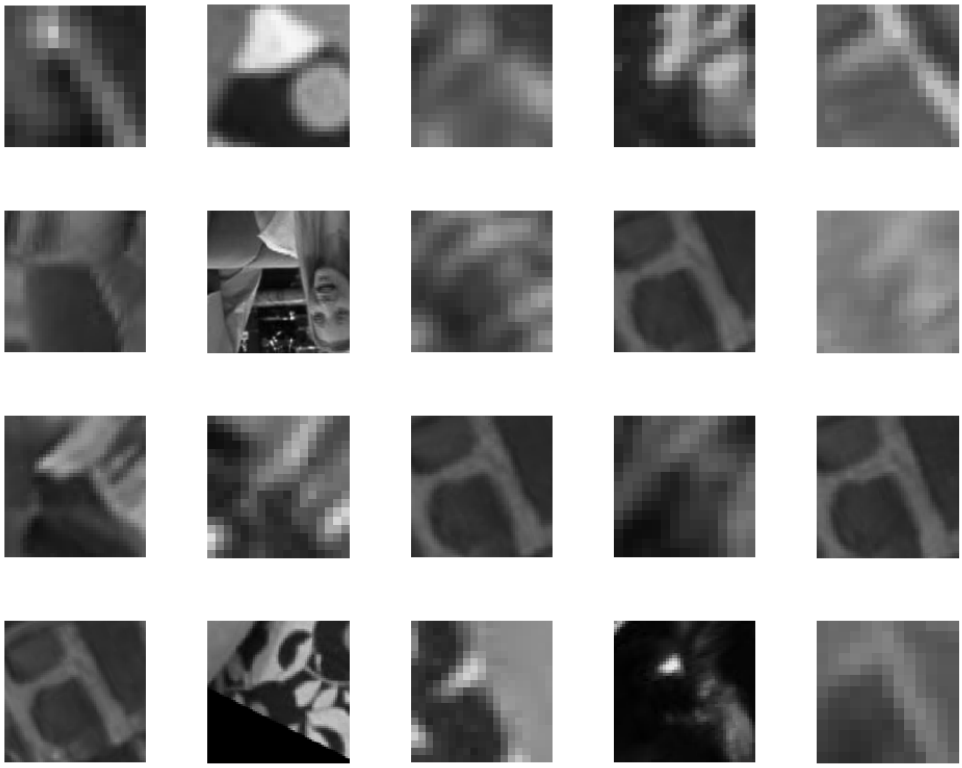
In this case, the matched descriptor pairs may not always be similar.
Matched descriptors:



2 Patches for word 84



Patches for word 604:



3 Example 1 Input:

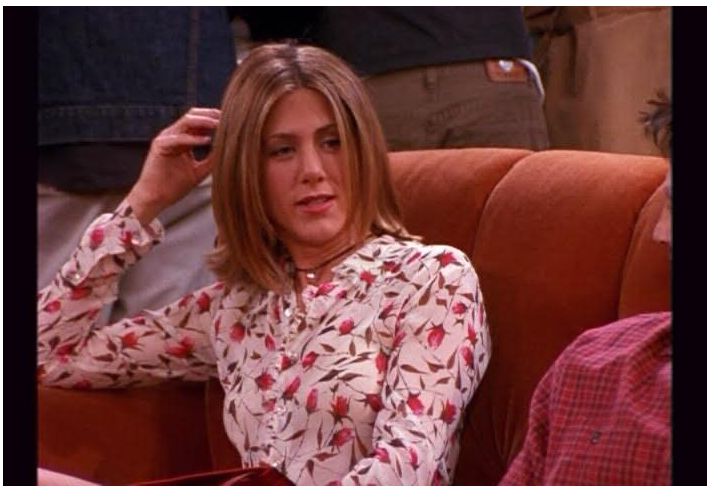
Example 2 input:

Example 3 input:

The similar frames are usually the consecutive frames or the frames that have common objects.

4.
Failure case input:

Successful case input:



The failure case may be due to the fact that the phone region is too small.