Assignment 2

Chinmay Parekh
IMT2020069

1)Explain how SURF is different from SIFT:
The scale-invariant feature transform (SIFT) is an algorithm used to detect and describe local features in digital images. It locates certain key points and then furnishes them with descriptors which are supposed to be invariant against various transformations which might make images look different although they represent the same object.SURF is the speed up version of SIFT. In SIFT, Lowe approximated Laplacian of Gaussian with Difference of Gaussian for finding scale-space. SURF goes a little further and approximates LoG with Box Filter. One big advantage of this approximation is that, convolution with box filter can be easily calculated with the help of integral images. And it can be done in parallel for different scales. Also, the SURF rely on determinant of Hessian matrix for both scale and location.
Also in SIFT,the size of the descriptor is 128 bits while in SURF it is 64 bits.

Briefly explain the main principles of FLANN matching and RANSAC
The main principles of FLANN are as follows:
1.Feature detection: distinct features are detected in each of the two images using SIFT or SURF.
2.Feature description:Descriptors for the distinct features are computed.
3.Indexing:The descriptors of the features in one image are indexed using a nearest neighbor search algorithm.
4.Matching and Filtering: Nearest neighbor search is done on each feature in the second image to find the best matching feature.Filtering is done to eliminate false matches.
5.Transformation:Transformation matrix is estimated using the true matches that maps the coordinates of the matched feature in both the images.

The main principles of RANSAC are as follows:
1.Random sampling: After selecting a model that can represent the data, RANSAC randomly selects a subset of data points called minimal sample to define the model.
2.Model fitting: The minimal sample is used to fit the model to the data points.

3.Inlier identification:Fitted model is used to identify the data points consistent with the model.
4.Consensus set:Steps 2-4 are repeated and RANSAC keeps track of the largest set of inliers found. This set is called the consensus set.It represents the data points that are most likely to belong to the model.
5.Refinement:Model cal be refined using all the inliers using any standard algorithm.