

Part I

1. a. Low-pass filtering.
2. a. Mean-shift.
3. d. None of the above.
4. c. Apply a low-pass filter and down-sample the image
5. b. An airplane at a high altitude.

Part II

Outlier rate: $p=0.25$ (25% of the data is outliers).

Inlier rate: $1-p=0.75$ (75% of the data is inliers).

Desired probability of having at least one inlier-only sample: $P=0.25$.

The probability that a single sample is an inlier-only sample is $(0.75)^8$.

The probability that a single sample is not an inlier-only sample is $1-(0.75)^8$.

The probability that none of the k samples are inlier-only samples is $[1-(0.75)^8]^k$.

Having at least one inlier-only sample:

$$[1-(0.75)^8]^k = 1 - P$$

Substituting $P=0.25$,

$$[1-(0.75)^8]^k = 0.75$$

To find k , we take the natural logarithm of both sides:

$$k \ln[1-(0.75)^8] = \ln(0.75)$$

Solving for k :

$$k = \ln(0.75) / \ln[1-(0.75)^8]$$

So the number of samples needed to assure with 25% probability that at least one sample is all inliers is:

$$k = \ln(0.75) / \ln[1-(0.75)^8]$$