

Assignment II - Digital Image Processing (EE-402)

Target Recognition in Aerial Images

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Deadline: Till Sunday 22 October 22h55d

Attention: You can submit your assignment by the night (22h55) of last date. Late submissions will get zeros. You are welcome to consult each other and discuss the solutions among you, but everybody should write their own code. In case of copying both (or all) the assignments will get zero (no exceptions). You are welcome to ask questions and post queries on Slate.

Task

In this assignment, your goal is to develop and implement an image processing algorithm for large linear target recognition in aerial images with the help of course material covered so far. Few examples of linear targets including **runway, bridges and dam** are shown in Figure-1. Conventional algorithms usually recognize the given target by following four steps:

- a) Finding the edges in the image.
- b) Apply line detection tool such as Hough transform to detect all the lines near target's expected orientation.
- c) These detected lines are then clustered using distance extent based on which only a few lines are retained for further processing.
- d) Finally, best line is selected by comparing the features of neighborhood regions located on either side of a detected line. Target coordinates are then reported near the center of the best line.

In your work, you need to implement all above steps in different functions and produce results on the **attached images**, similar to Figure-1. For development of your target recognition algorithm you can get help from literature. Few recommended research papers to study are:

- [1] Huertas A., Cole W. and Nevatia R., "Detecting runway in complex airport scenes", Computer Vision Graphics and Image Processing, Vol. 51(2), pp. 107-145, 1990
- [2] Di N., Zhu M. and Wang Y. N., "Real time method for airport runway detection in aerial images", Proc. International Conference on Audio Language and Image Processing, pp. 563-567, 2008

- [3] L. Abraham and M. Sasikumar, "A fully automatic bridge extraction technique for satellite images", International Journal of Information Processing, 6(3), 89-97, 2012
- [4] Z. Zhen, Z. Tianxu, W. Guoyou, "Research on bridge recognition in long-range infrared images", ACTA Electronica Sinica, Vol. 26, No. 11, 1998
- [5] L. Abraham, M.Sasikumar, "Detection of bridges using different types of high resolution satellite images", Int. J. on Recent Trends in Engineering and Technology, Vol. 10, No. 2, 2014

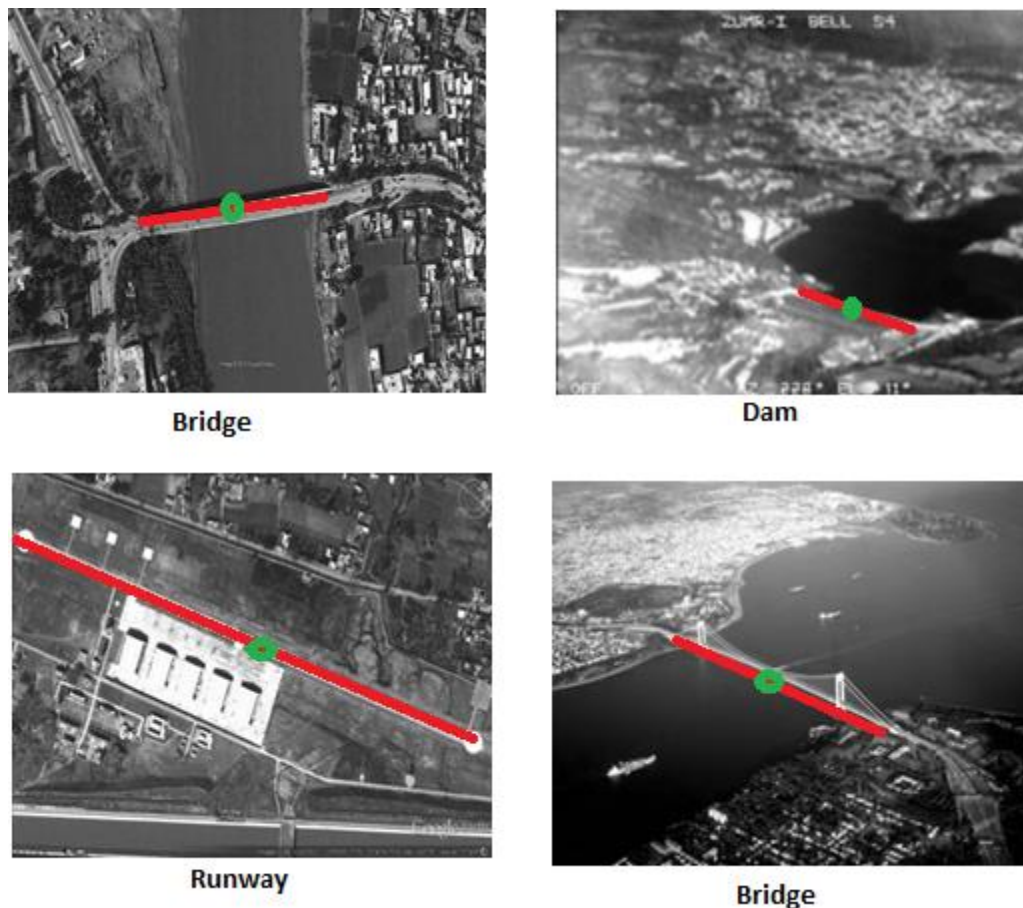


Figure 1: Example detections for different targets

What to hand in

You need to submit the following things:

1. Report presenting your proposed algorithm and results.
2. Source code files.

You must submit your assignment using the SLATE website.

- **Third Party Code** - In the assignment, you must implement **your own edge and line detection** algorithms.