Week 3 paper summary

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Summary

Viola and Jones [1] present a new framework, algorithms and insights for object detection and used it to build a face detection system. Their method is about 15 times faster than any published literature of that time. Their method is simple, practical and fast. There are three main contributions: 1) using integral image representation which is for every location, summing the pixels above and to the left of it. This can be computed using only a few operations. These rectangle features are primitive but efficient. 2) Training a variant of AdaBoost classifier to select only a few important visual features. AdaBoost is an ensemble of weak learners. In their case, each weak learner is constrained to find the best rectangle feature that minimizes the classification error. The last step of this paper is the attentional cascade. The cascade results in rapid rejection of non object features and focusing more on objects of interest. In the cascade, a positive result of a classifier triggers the second classifier and so on. Any negative result will cause rejection of that feature. Each stage in cascade reduces false positive rate and detection rate. A target is set for both to be met. The attention cascade is very efficient since many parts of an image are non-objects and get rejected. Overall, the framework presented in this paper has many practical applications for its high speed and accuracy.

References

[1] Paul Viola and Michael Jones. Rapid object detection using a boosted cascade of simple features. In *Proceedings of the 2001 IEEE computer society conference on computer vision and pattern recognition. CVPR 2001*, volume 1, pages I–I. IEEE, 2001.