ActorExtractor: NxN matching and feature extraction using ORB

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Abstract

This paper discusses the result of NxN feature matching using ORB(Oriented FAST and rotated BRIEF) feature extraction algorithm. A novel dataset is used containing 510 images of several actors at 3 to 4 different ages .The system is end-to-end and is optimized for time and space requirements. The system can be extended to real time identification of an actor .The performance parameters speak for the high accuracy of the system.

Keywords: ORB(Oriented FAST and rotated BRIEF), feature extractor

1. Introduction

Nowadays, feature extraction is a core component of the computer vision pipeline. Various techniques are applied to get features that will be useful in classifying and recognition of images. Some of the popular feature extracting methods include SIFT, SURF, ORB, ArcFace, CosFace and more. In this system we used Oriented FAST and Rotated BRIEF (ORB) feature extractor. It was developed at OpenCV labs by Ethan Rublee, Vincent Rabaud, Kurt Konolige, and Gary R. Bradski in 2011, as an efficient and viable alternative to SIFT and SURF. ORB was conceived mainly since SIFT and SURF are patented algorithms. whereas, ORB is free to use. ORB is also rotation invariant and resistant to noise Rublee et al. (2011)

2. Approach

An ORB feature extractor was taken with nfeatures = 5000. Then a Brute Force matcher was applied on the received data of key-points and descriptors . Given a threshold , all the matching distances below it were selected out of the total giving us the percentage of similarity among the 2 images. This was done for all the 510x510 images.Any two images before comparison were first normalized and resized to common dimensions.The acquired images are then passed to the proposed network for feature extraction. The extracted features are further used for comparison and decision. For that the similarity values were then compared with the actual similarity of the images (0 or 1). Thereby calculating the confusion matrix , accuracy, FAR, FRR, CRR and EER. The threshold(hyper-parameter) was then varied to select the value with the minimum error rate. A similar approach followed by Karami et al. (2015)

2.1 Matching

the following figures shows some of the ORB feature matching with the corresponding threshold and similarity with nfeatures being 5000.

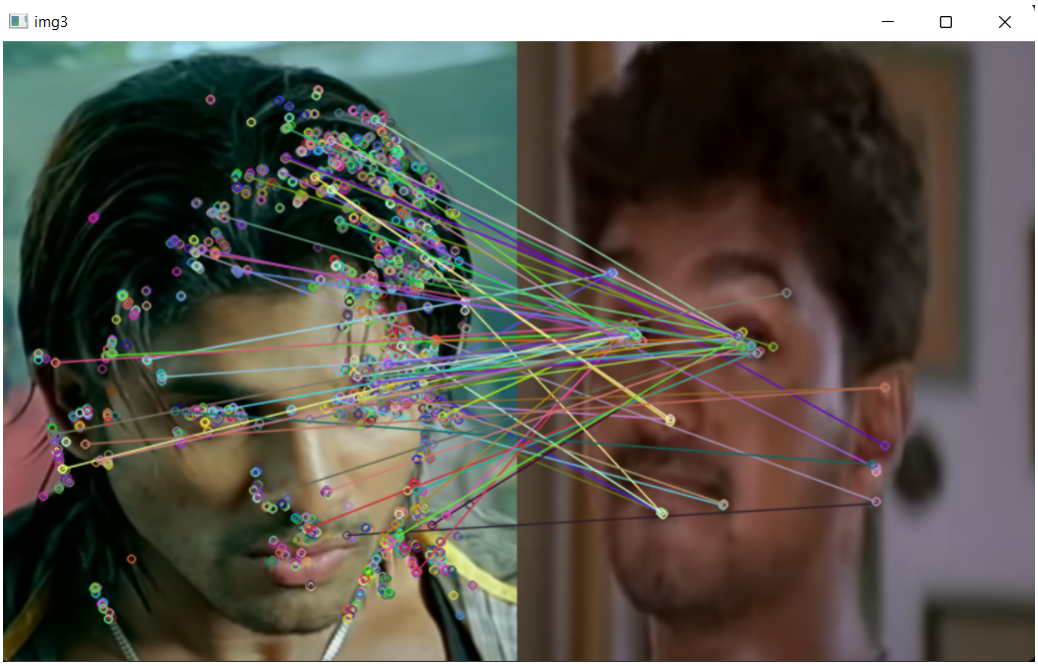


Figure 1: threshold = 400 , similarity = 0.0

Figure 2: threshold = 100 , similarity = 1.0

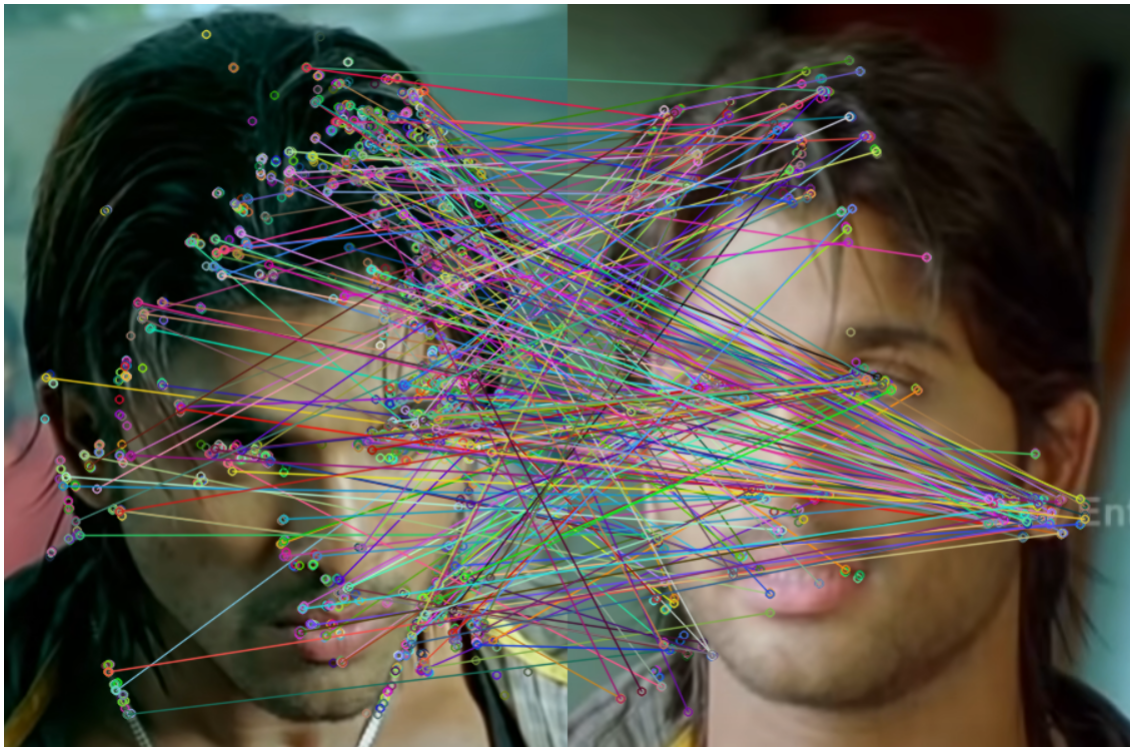
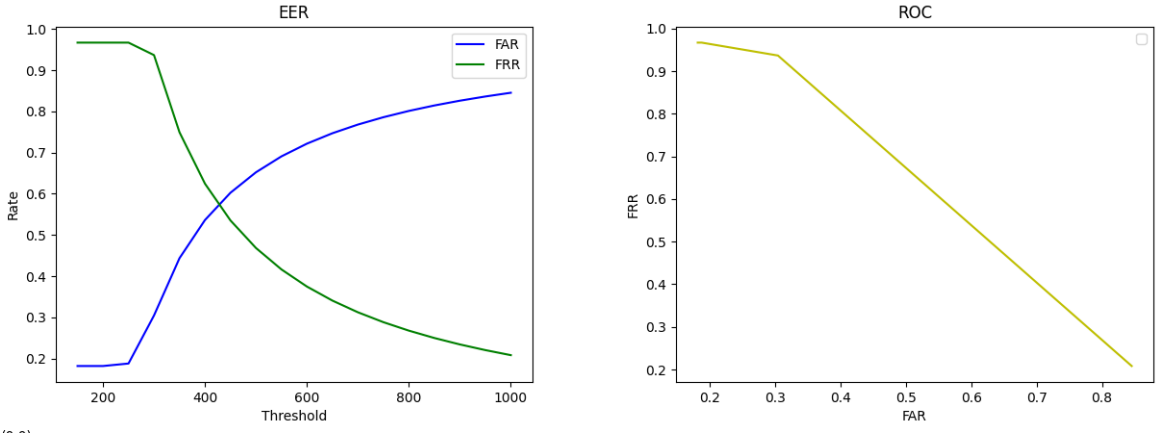


Figure 3: threshold = 325 , similarity = 0.62

3. Result

The figure on the left represents Rate vs Threshold(hyper-parameter) graph. It also gives us the Equal Error Rate as 58% with the corresponding threshold being 420. The figure on the right depicts False Rejection Rate (FRR) vs False Acceptance Rate (FAR) also known as Receiver Operating Characteristic (ROC) curve.



4. Conclusion

This paper checked the accuracy of handcrafted feature extraction method such as ORB on a fresh dataset. The system took large time in the evaluation of similarity among images for this huge dataset but was met with success due to its high accuracy. Correct recognition rate (CRR) of the proposed method is also found to be 86%. It has acheived an Equal Error Rate (EER) of 58% with accuracy as high as 78.82%. hence I conclude that ORB is a fast and effective scale and rotation invarient feature extraction method .

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References

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