

A Novel Approach for Real Time Face Detection

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Outline

- Related past and proposed work
- Experimental results
- Performance analysis
- Conclusion and future work

Related past and proposed work

Related work

Proposed Algorithm-(RTFDT)

Experimental results

Single and multiple face identification

Limitations

Performance analysis

Conclusion and future work

Related work

	Viola and Jones	Eigen Face	CAMShift
Pros	<ul style="list-style-type: none">➤ Rapid and Robust➤ Multiple face detection	<ul style="list-style-type: none">➤ Highly efficient for face recognition	<ul style="list-style-type: none">➤ High speed object tracking
Cons	<ul style="list-style-type: none">➤ No detection of side /tilted faces➤ props may interfere➤ Very slow with large images	<ul style="list-style-type: none">➤ Heavy computational complexity	<ul style="list-style-type: none">➤ Depends on Background and foreground colour difference

Figure : Advantages and disadvantages of algorithms available

Real Time Face Detection and Trackin(RTFDT)

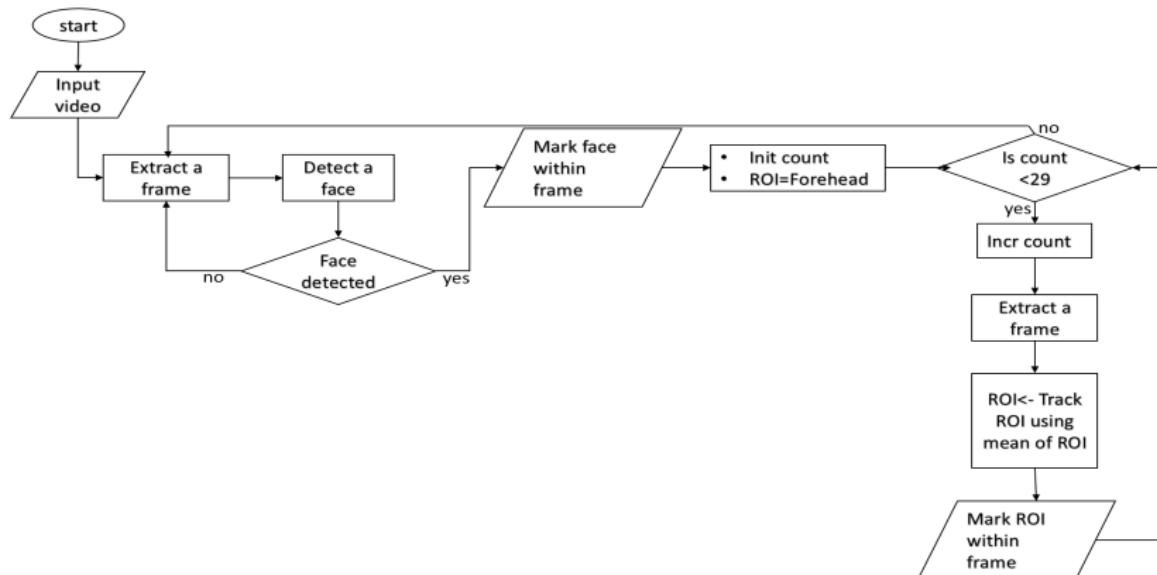


Figure : Block diagram of proposed algorithm

Single and multiple face identification

Single face as well as multiple faces can be identified.

Output video



Figure : Single face identified



Figure : multiple face identified

Limitations

- ▶ Slow when face is not detected for long duration.
- ▶ CAMShift output is ambiguous when colour difference of background and foreground is low.
- ▶ In case of side faces as well as faces with props(glasses, cap, beard), output will be ambiguous.



Figure : False face detection due to low difference in back ground and foreground colour

Performance analysis(1/2)

- ▶ Hardware specifications: Four core processor, 4GB RAM
 - ▶ Implementation Environment: Python & OpenCV
 - ▶ Output video frame rate: 42 fps
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- ▶ **Time complexity of viola & Jones:** $O(5m^2)$, where m is dimension of input frame
 - ▶ **Time complexity of CAMShift:** $O(\alpha n^2)$, where n is size of ROI window and α is constant
 - ▶ **For our algorithm :** Viola & Jones for 1/29 frames and CAMshift 28/29 frames
 - ▶ **Best case time complexity:** $1/29*O(5m^2)+28/29*O(\alpha n^2)$

Performance analysis(2/2)

- ▶ **Worst case time complexity:** $O(5n^2)$
- ▶ Worst case for this algorithm will be a video in which there is no face because in such situation subsequent frames are going to go through Viola and Jones algorithm only, in order to find face(s) in an image.

Conclusion and future work

Proposed algorithm is very efficient in terms of time but it inherits the limitations of Viola & Jones algorithm and CAMShift algorithm.

Future work

- ▶ Algorithm for face detection can be modified inorder to identify faces with props and side faces.
- ▶ Parallel programming can be implemented by which on can process multiple frames at a time.

Thank You.

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Apendix-I

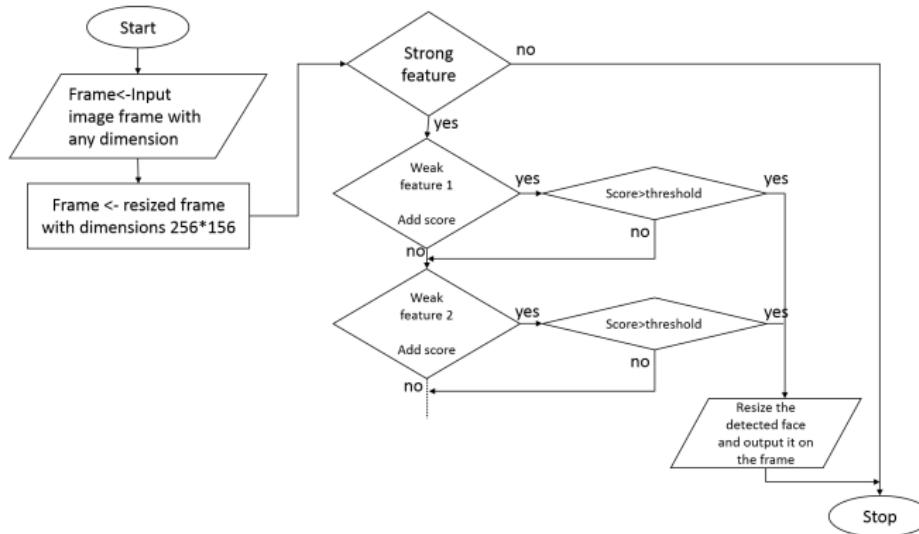


Figure : Block diagram for Viola & Jones algorithm

Apendix-II

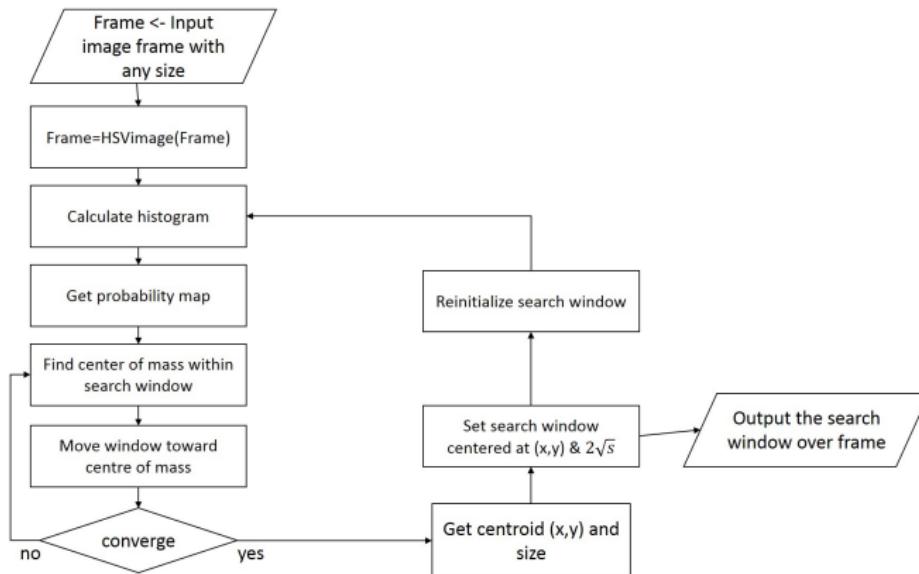


Figure : Block diagram for camshift algorithm