



上海交通大学

SHANGHAI JIAO TONG UNIVERSITY



1896



1935



1987



2006

Moving Target Monitoring in Video Surveillances

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Research Background

- The surveillance camera system is widely used in our daily life.
- Video data currently is used only "after the fact" as a forensic tool, thus losing its primary benefit as an active, real-time medium





Experimental Method

➤ Python: a high-level programming language for general-purpose programming

➤ OpenCV: a library of programming functions mainly aimed at real-time computer vision





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Gaussian Mixture Models

2

Morphology filtering

3

Camshift tracking algorithm

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Cross-border warning

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Analysis and Conclusion



Background Modeling Based on Gaussian Mixture Models

➤ Scheme Comparison

Scheme	Advantage	Disadvantage
Mean Value Modeling	less calculation, high velocity	Big storage space, moving objects with low velocity will be recognized as background
Single Gaussian Background Modeling	less calculation, high velocity, small storage space	Influenced by illumination and moving foreground
Gaussian Mixture Background Modeling	the shadow and noise of its movement foreground are less	More calculation
Final choice: Gaussian Mixture Background Modeling		
Reason: it could deal with complicated environment		



Background Modeling Based on Gaussian Mixture Models

➤ Results



Raw image



Gaussian mixture model



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Morphology filtering

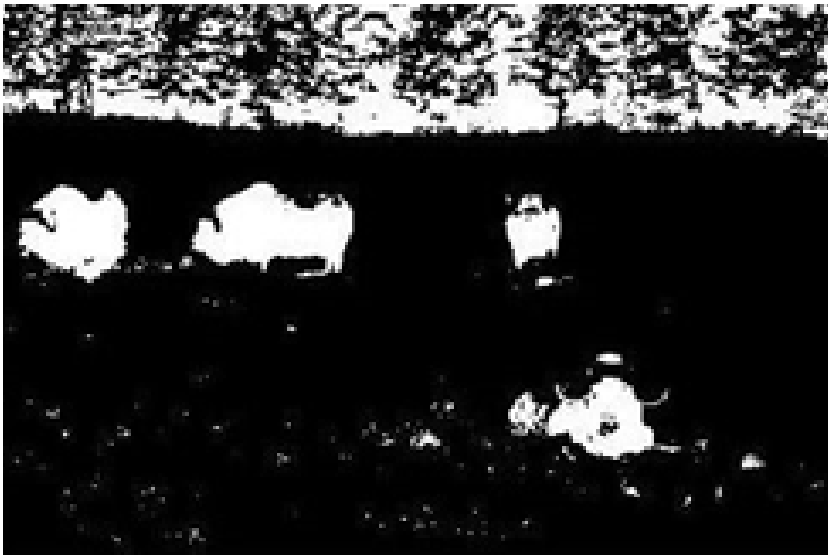
➤ Base operation

	Erosion	Dilation
Principle	It eliminates the boundary point and causes the boundary to shrink internally	It expands the shapes contained in the input image.
Effect	Small objects in the foreground will be ignored	Figures that are very lightly drawn get thick when "dilated".



Morphology filtering

➤ Results



Raw image



Image after erosion



Image after dilation



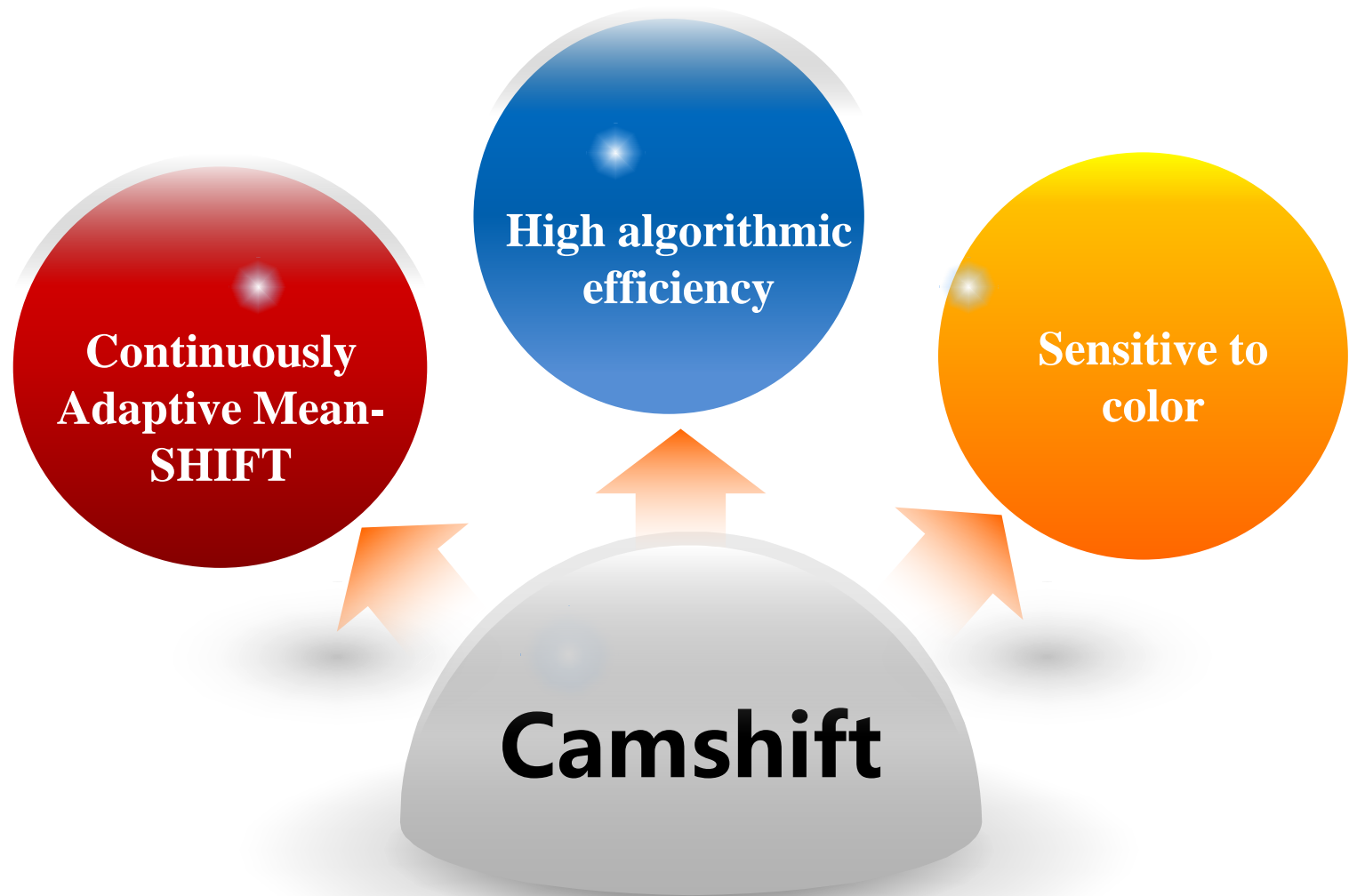
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Camshift tracking algorithm

➤ Camshift Algorithm





Camshift tracking algorithm

➤ Camshift Algorithm





Camshift tracking algorithm

➤ A tracking algorithm based on modified Camshift

(1) Need to choose moving objects artificially, could not match targets automatically

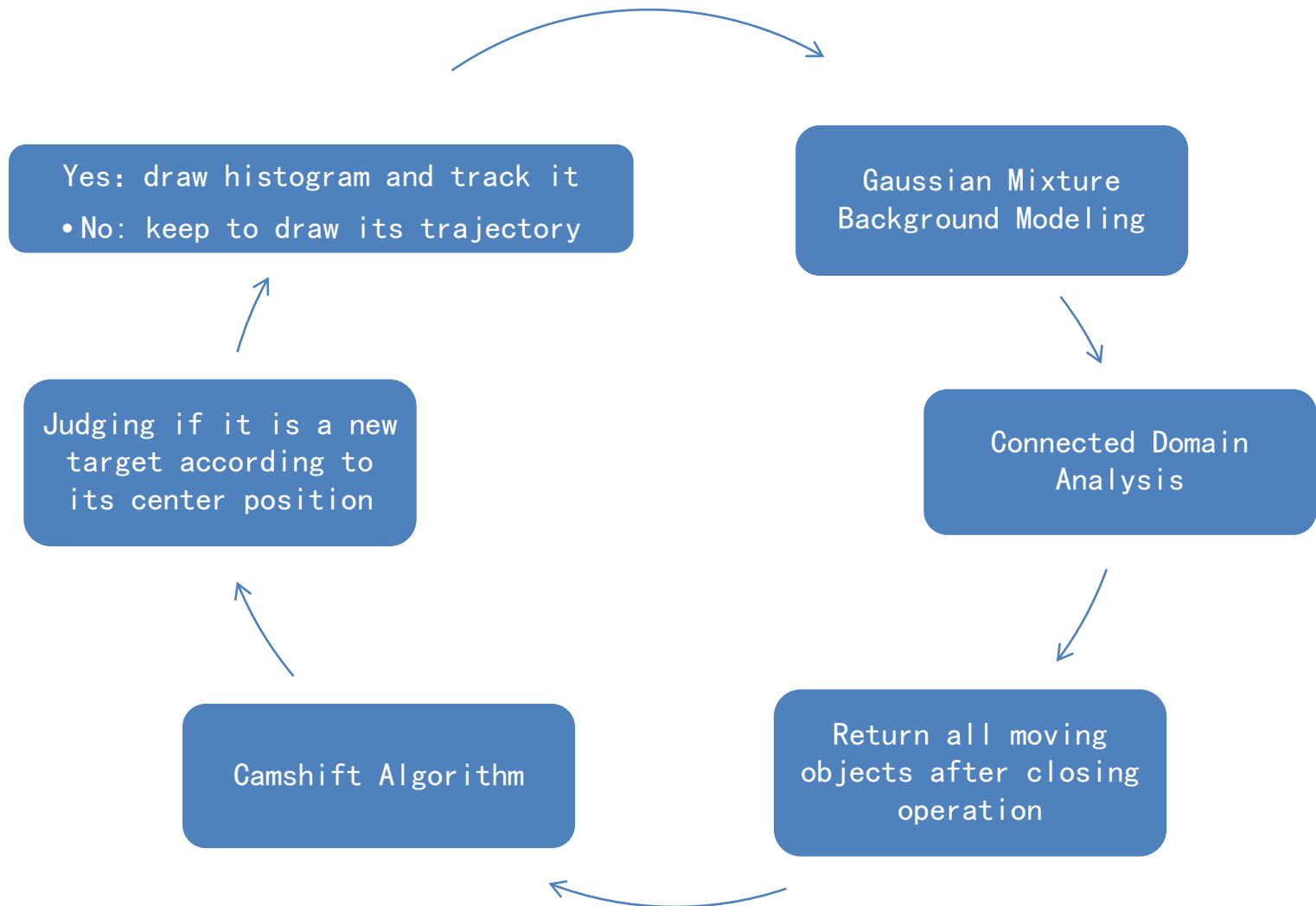
(2) Could only tracking one moving object





Camshift tracking algorithm

- A tracking algorithm based on modified Camshift





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Cross-border warning

➤ Algorithm Analysis

Define
parameter
s of
warning
border

Initialize
the
border's
RGB
value

Draw
border

Find
trajectories
according to
the center
position
between each
two frames






Judge if
there is
intersection
between the
trajectory
and border

If it
happens,
change
border's
RGB
value

Go on to
next
frame



Contents

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-  2 Morphology filtering.....●
-  3 Camshift tracking algorithm.....●
-  4 Cross-border warning.....●
-  5 **Analysis and Conclusion**.....●

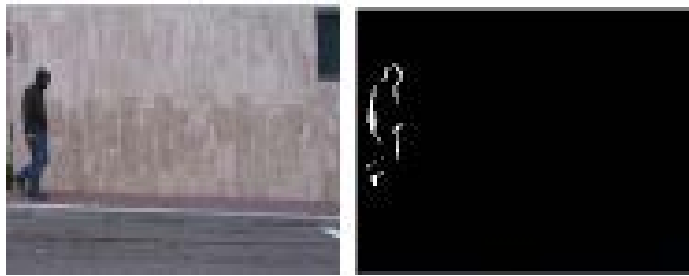


Problem Analysis

➤ 1 The retardance of gaussian mixture modeling

The Gaussian mixture modeling assumes that all pixels in the 1st frame are background. Since it updates the background by comparing differences between each two frames, the algorithm cannot do the modeling properly during the first 2-3s if there are some moving objects in the first frame, which leads to an error for following object detection.

The 1st frame



The 9th frame



The 25th frame



The 50th frame

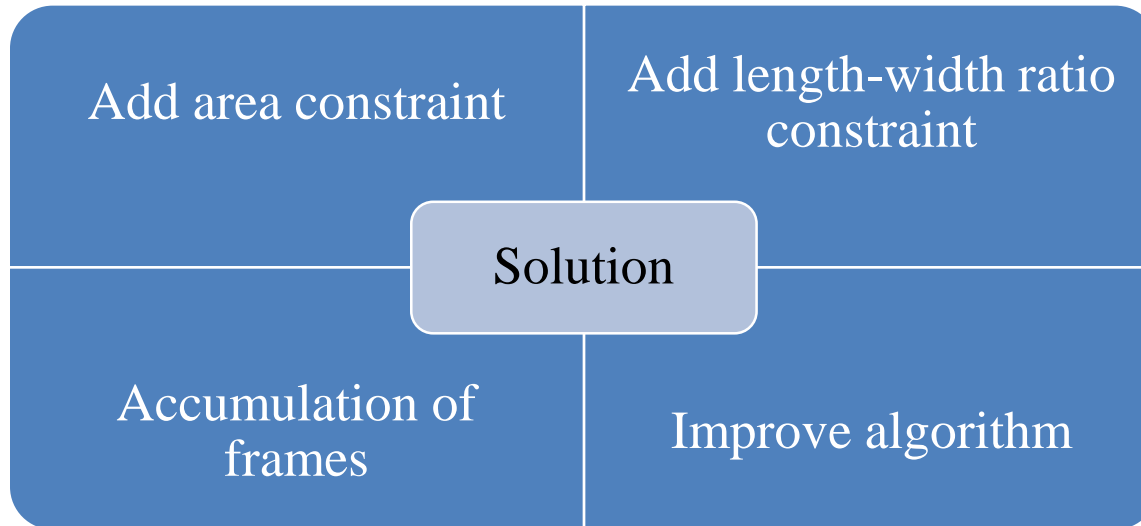




Problem Analysis

➤ 2 The strong dependency of details

This algorithm has strong dependency of details. When there is a moving object whose color is similar to our background or whose velocity is high, it cannot find its trajectory properly, which leads to the losing of objects.





Conclusion

➤ Content

- (1) The analysis of background modeling algorithm
- (2) Camshift tracking algorithm
- (3) Cross-border warning

➤ Prospect

- (1) Improve the robustness of the algorithm
- (2) Make it more intelligent
- (3) Be able to tracking complicated trajectory





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*Thank
You!*

