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A Light Weight Model for Video Shot Occlusion Detection

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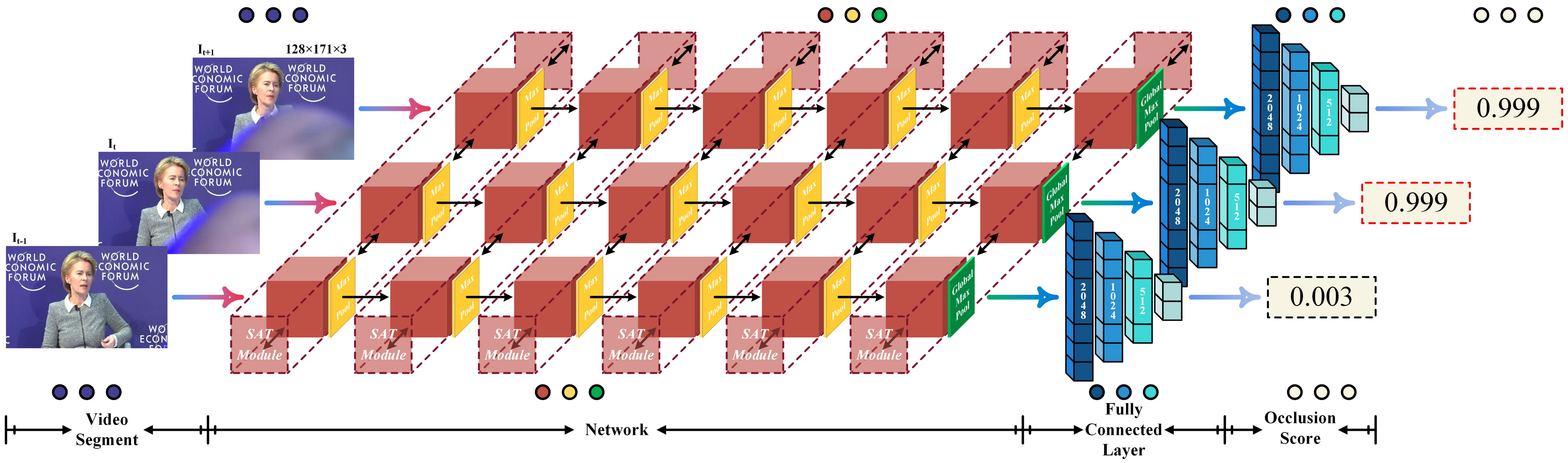
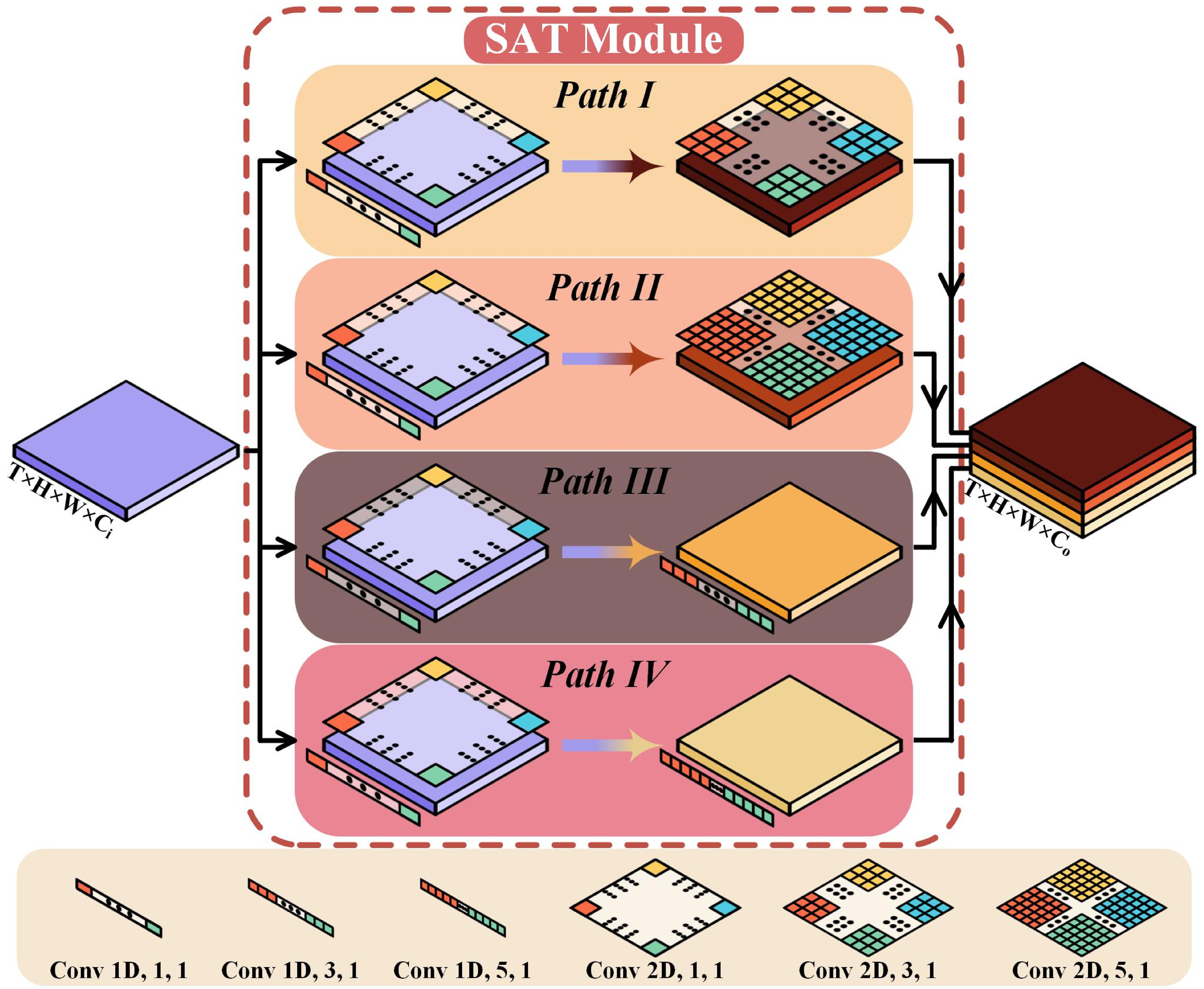
Architecture



The architecture of the proposed shot occlusion detection model

SAT Module



Structure of the SAT module

Loss Function

Firstly, we calculate the percentage $P_{occlusion}$.

$$P_{occlusion} = \frac{A_{occlusion}}{A_{frame}}$$

Where $A_{occlusion}$ is the area of occlusion and A_{frame} is the frame area.

Secondly, we calculate the maximum $P_{occlusion}$ in the video.

$$M_{occlusion} = max(P_{occlusion} \in V_i)$$

Where V_i represents the entire sequence of the i_{th} video.

Thirdly, we calculate the occlusion ratio $R_{occlusion}$.

$$R_{occlusion} = \frac{2 - (P_{occlusion} + \frac{P_{occlusion}}{M_{occlusion}})}{2\beta}$$

Where β is set to 10 as an equilibrium coefficient empirically.

Finally, we calculate and assign the weights.

$$L_{occlusion} = -e^{-R_{occlusion}}(t_j^i \log(p_j^i) + (1 - t_j^i)\log(1 - p_j^i))$$

Where t and p represent the tag and prediction results, respectively.

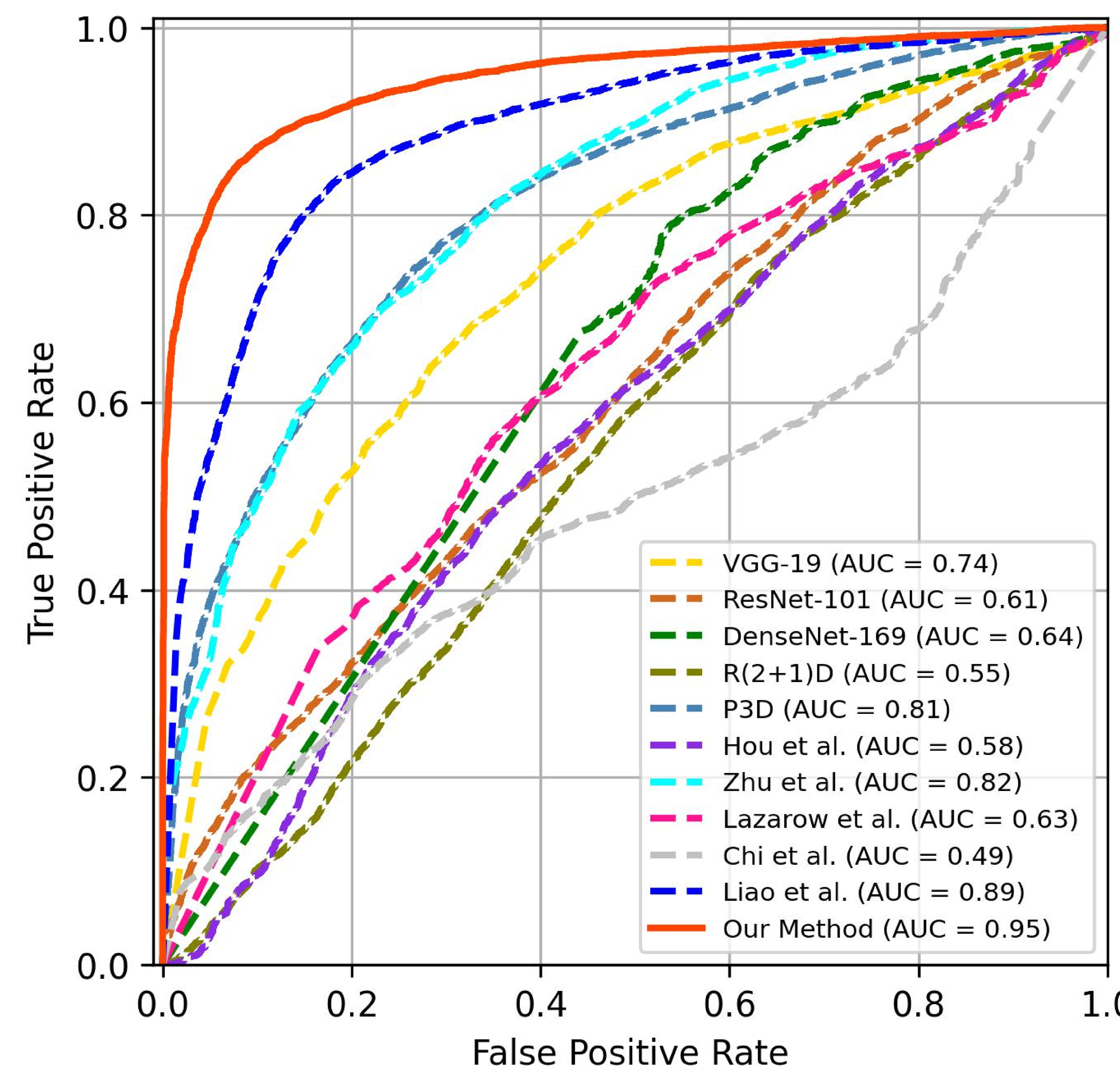
Contributions

- ★ We design a SAT module to extract spatio-temporal information instead of 3D convolution, and construct a new high-performance video shot occlusion detection framework based on this module.
- ★ We improve the existing occlusion detection loss function to more reasonably assign weights to occlusion frames, which significantly increases the accuracy of recognition.
- ★ The extensive experiments show that our shot occlusion detection method outperforms the state-of-the-art methods.

Result

Performance comparison with the state-of-the-art methods

Method	Parameters	Accuracy	FPS
VGG-19	139.59M	68.85%	70
ResNet-101	42.50M	61.06%	83
DenseNet-169	12.49M	65.56%	95
R(2+1)D	33.18M	59.10%	99
P3D	24.93M	74.09%	120
Hou et al.	23.51M	42.66%	60
Zhu et al.	15.76M	73.17%	61
Lazarow et al.	64.66M	62.26%	32
Chi et al.	40.78M	50.43%	33
Liao et al.	59.64M	82.70%	106
Our Method	**11.37M**	87.03%	**130**
Our Method+$L_{occlusion}$	**11.37M**	**88.25%**	**130**



ROC curves

Code and models are available at https://github.com/Junhua-Liao/ICASSP22-OcclusionDetection