

## Context

- o Detection of numerous small urban objects in high-definition aerial images: tombs in a cemetery
- o Image database: 24 aerial image of 5,000 x 5,000 pixels (2.5 cm/pixel)
- o Object: a tomb (around 100x100 pixels, very variable in shape and appearance)

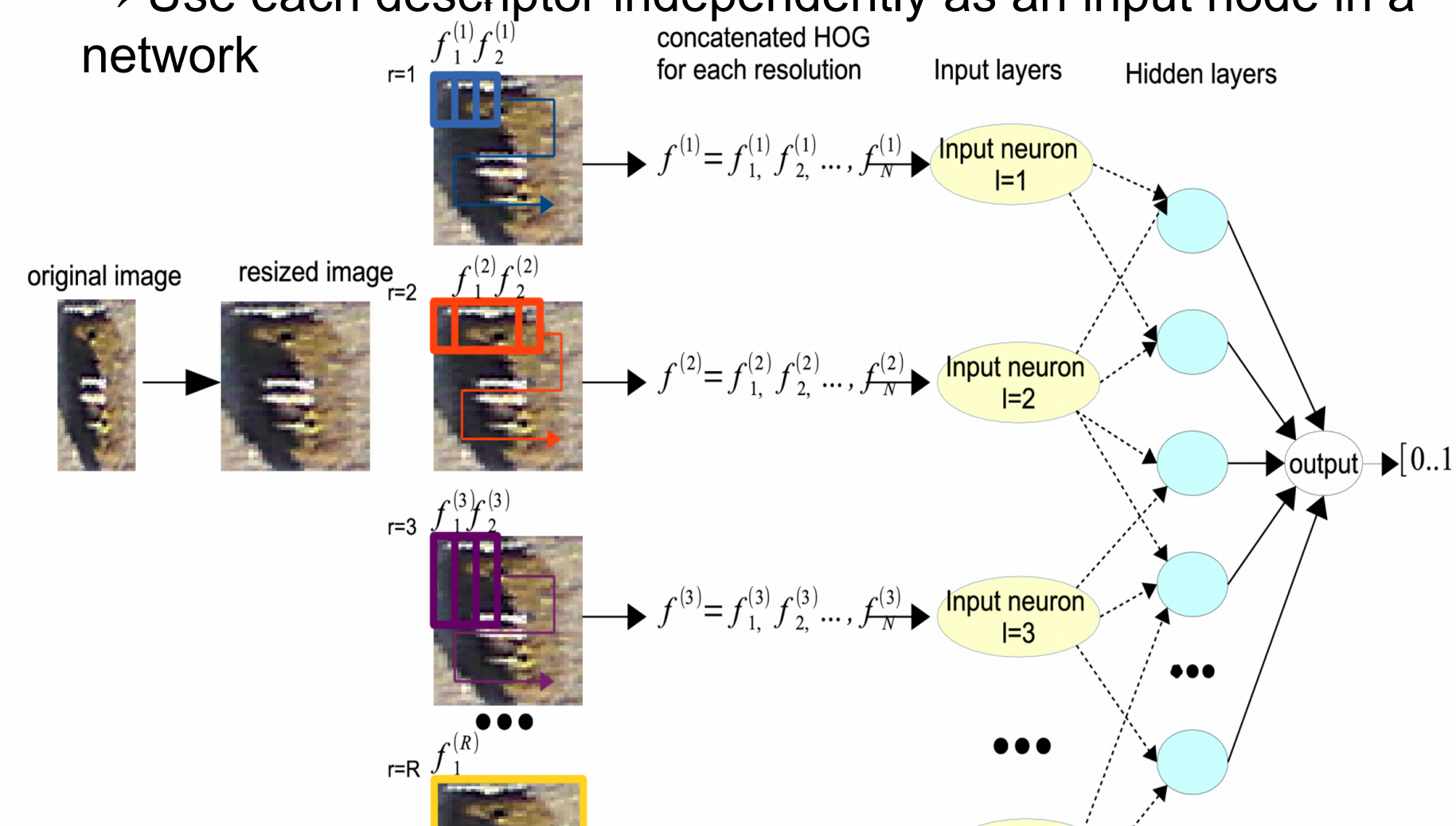


## References

- [1] P. Viola and M. Jones, "Rapid object detection using aboosted cascade of simple features," CVPR 2001.
- [2] Qiang Zhu, Qiang Zhu, Shai Avidan, Shai Avidan, Mei chen Yeh, Mei chen Yeh, Kwang ting Cheng, and Kwang ting Cheng, "Fast human detection using a cascade of Histograms of Oriented Gradients," CVPR 2006.
- [3] Anelia Angelova, Alex Krizhevsky, Vincent Vanhoucke, Abhijit Ogale, Dave Ferguson "Real-Time Pedestrian Detection With Deep Network Cascades", BMVC2015'

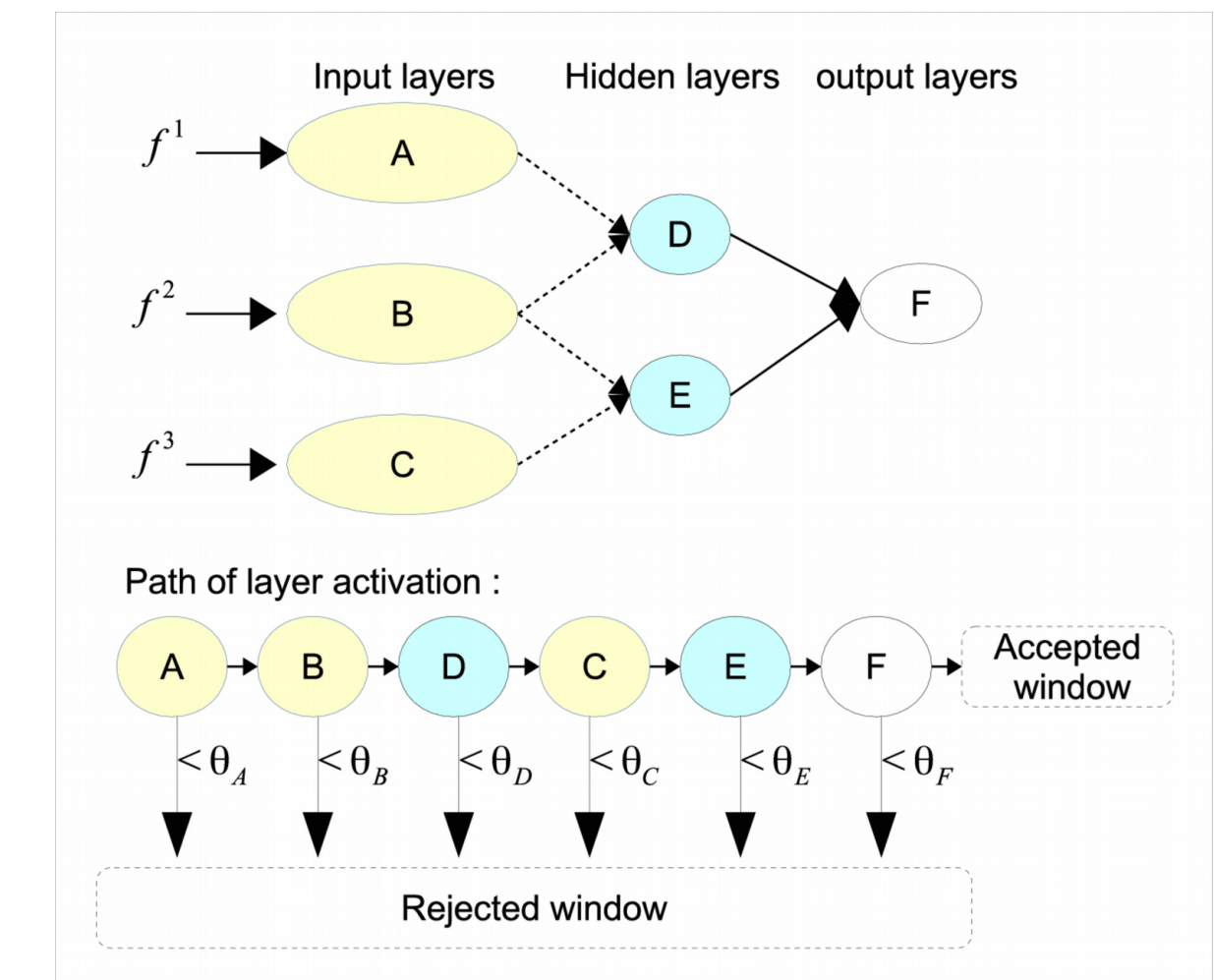
## Network of Linear SVM

- o Requirement of multi-scale descriptors
  - Use HOG descriptors at different resolutions [2]
- o Concatenating them into a single vector may lose some information
  - Use each descriptor independently as an input node in a network



## An efficient activation scheme to speed-up processing

- o Expensive computational cost
  - cascade reject system manner [1, 3]
  - stop exploration asap
  - Activation path



## Resultats and evaluation

Approaches	Time (HH:MM)	Average precision
Single SVM	15:54	60.6%
Our SVM network	24:35	75.0%
Activation path	04:58	75.3%

Compare to a single SVM the network of linear SVM **increases the precision by 17%**. However without the use of our optimisation (use of an activation path) the computational cost increase of almost **50%**. With the use of our optimisation (use of an activation path) the computational cost is reduced by a **5.5 factor**.

# AN EFFICIENT MULTI-RESOLUTION SVM NETWORK APPROACH FOR OBJECT DETECTION IN AERIAL IMAGES

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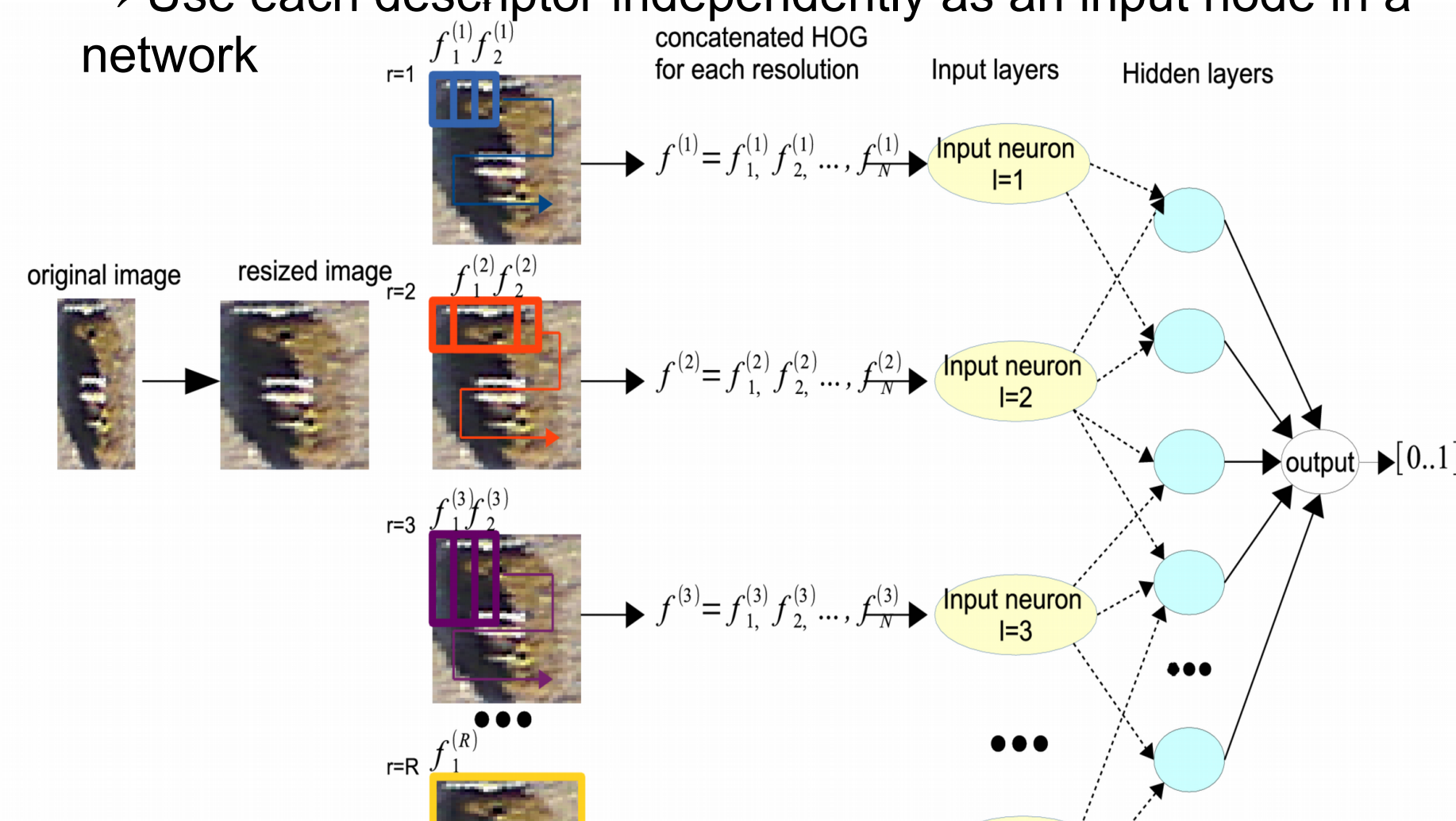
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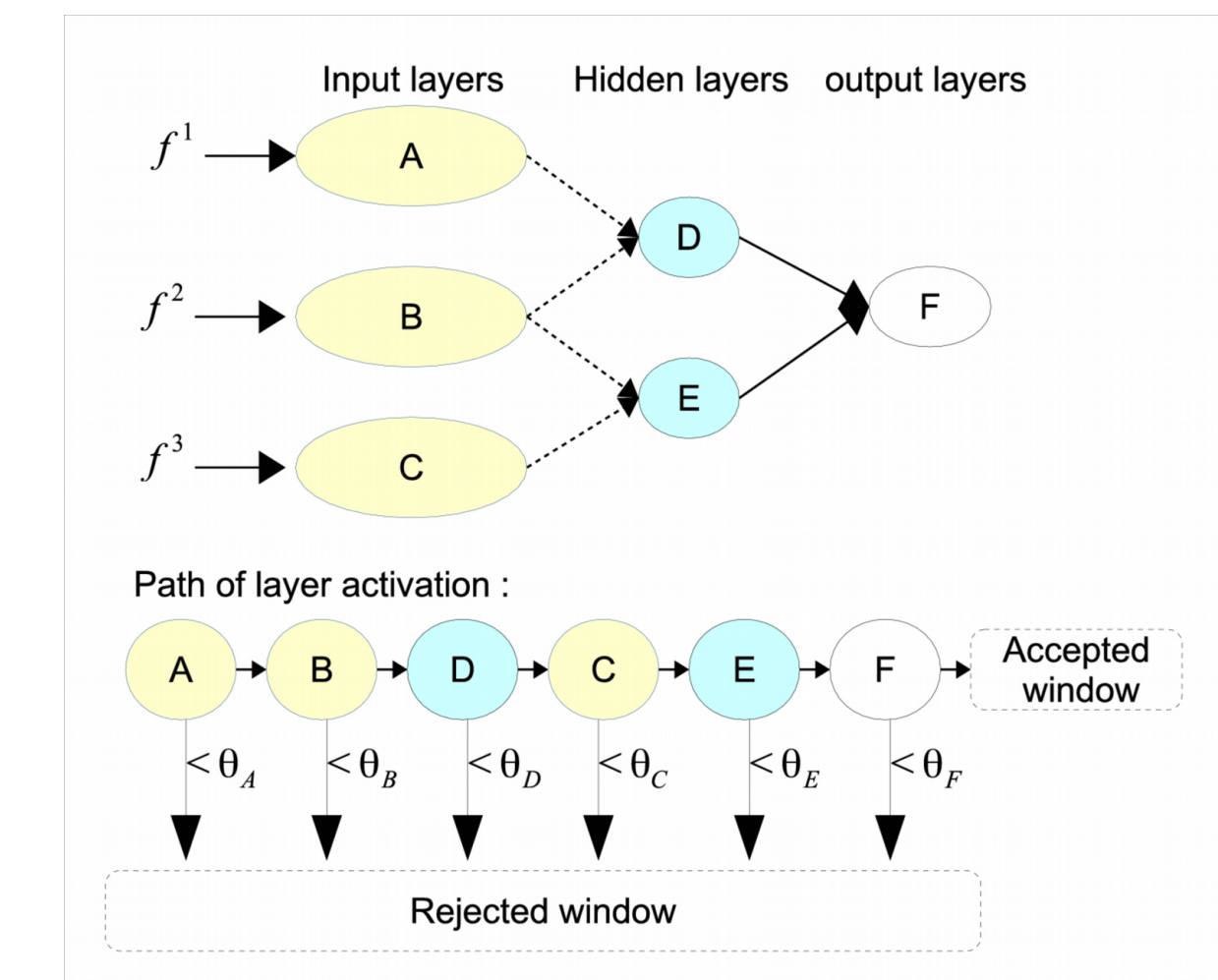
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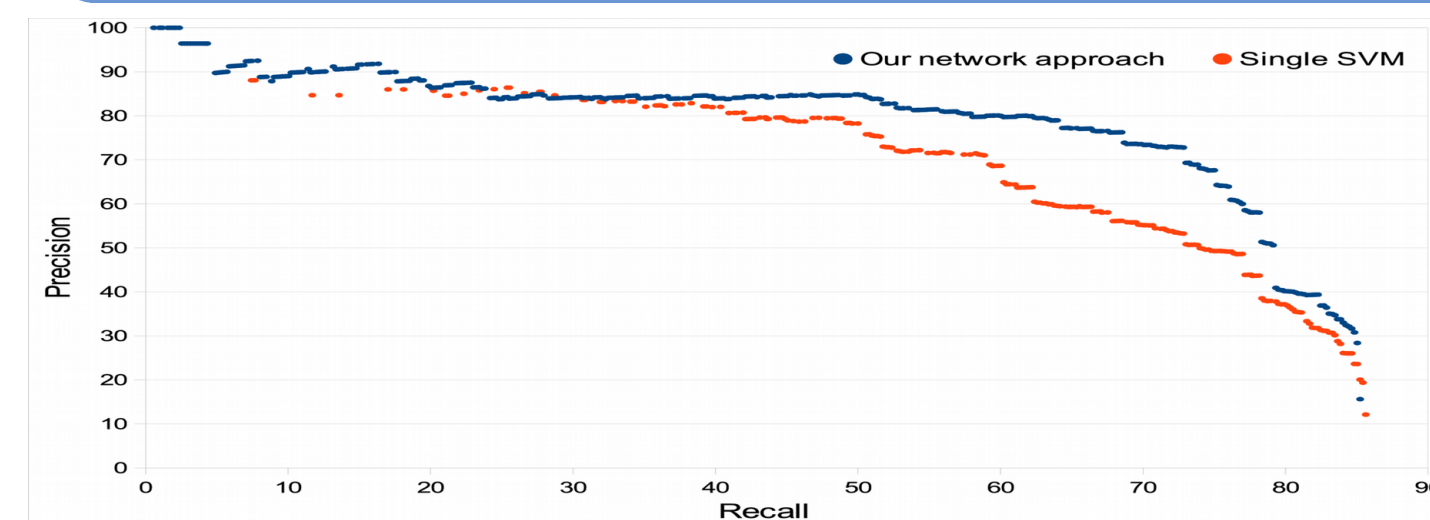
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