

Mid-level Elements for Object Detection

Analysis of Failure Modes

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1. Failure Modes

We use the diagnostic framework from [2] to better understand the failure modes of our system on PASCAL VOC-2007 [1] (See Section 4.2 in main paper). As the Figure 1 shows, in case of person, the localization error is quite significant (the right most curve in Figure 1). One way to combat this kind of error would be to include more spatial information in the feature vector, though naive approach may result in a prohibitively large feature. Note, however, that we don't need to use all visual elements simultaneously (in contrast with other representations); hence, once we have identified a category and merely need to localize it, we might build a more sophisticated feature vector using only the relevant elements. As a future work, we plan to investigate if we can use category-specific mid-level elements to localize better. In case of animals also, both localization and similar-category errors indicate considerable room for improvement.

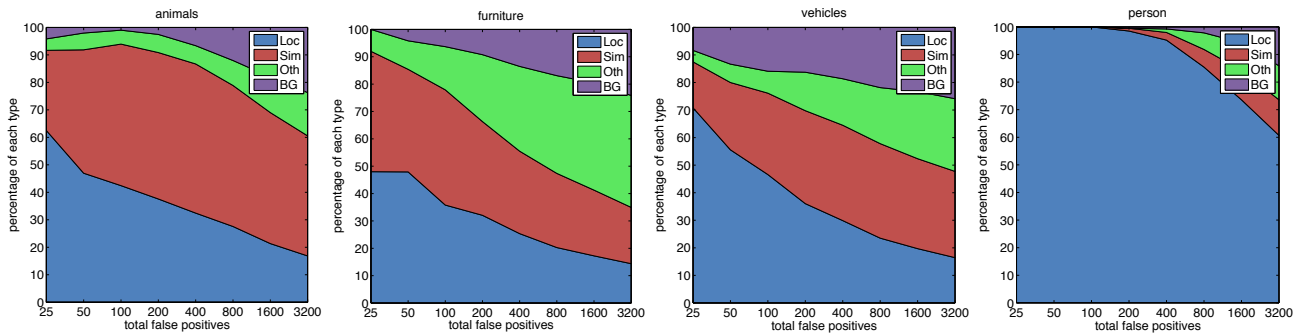


Figure 1. Diagnostic analysis using [2] to better understand the failure modes of our system.

2. False Positives

In the remaining part of this document, we analyze failure modes for each category using a pie-chart and present qualitative examples highlighting some top false positives for each class.

aeroplane

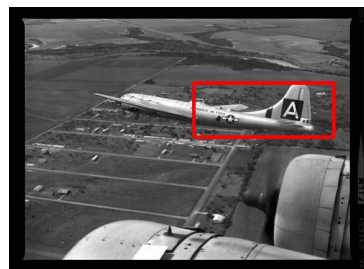
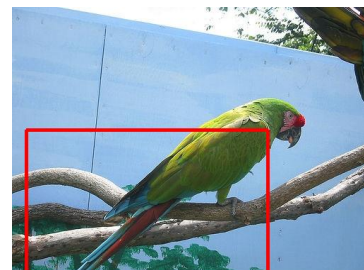
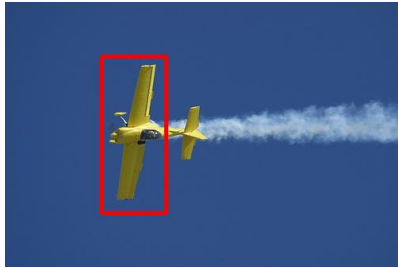
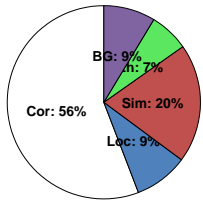


Figure 2. Failure Modes for aeroplane.

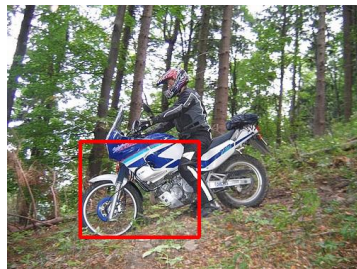
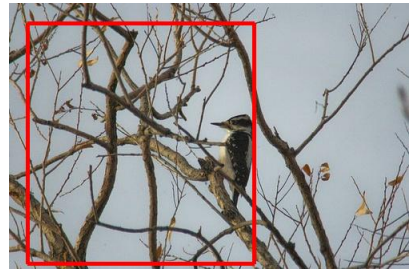
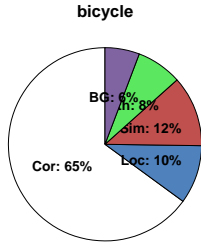


Figure 3. Failure Modes for bicycle.

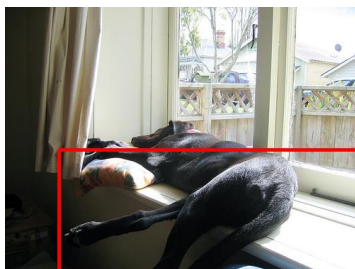
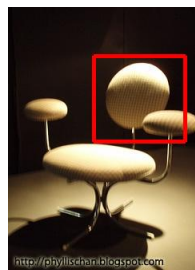
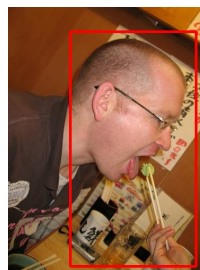
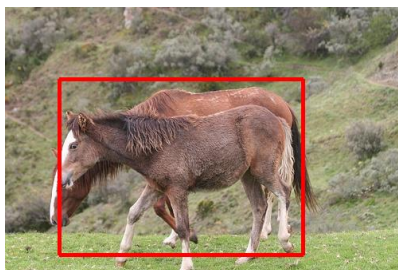
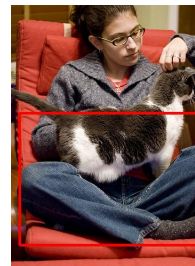
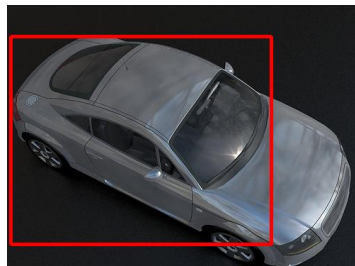
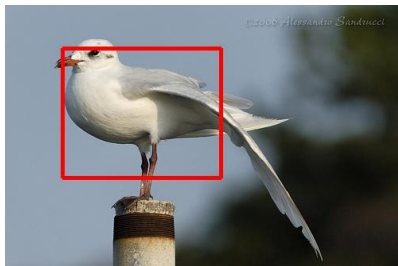
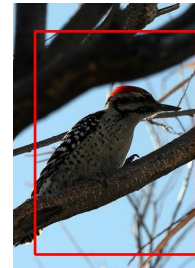
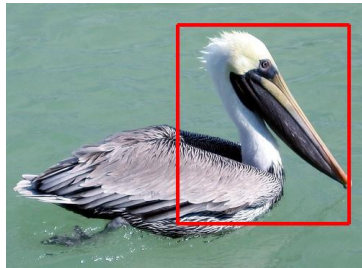
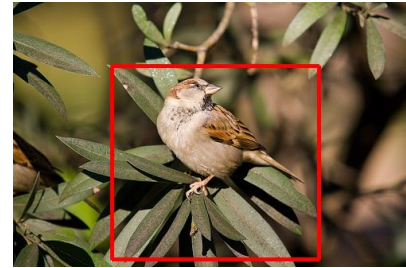
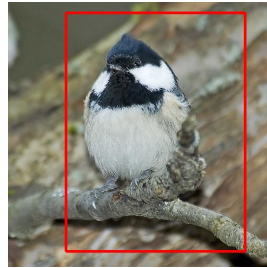
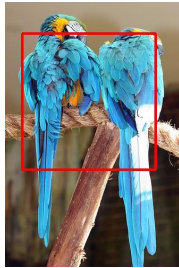
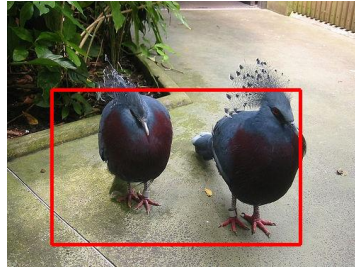
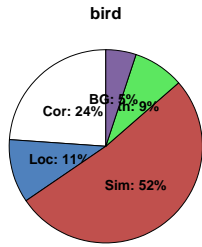


Figure 4. Failure Modes for bird.

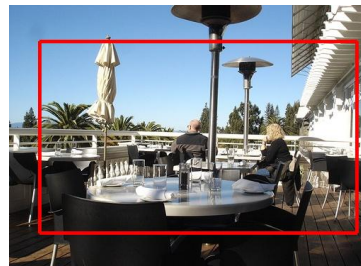
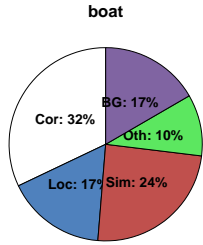


Figure 5. Failure Modes for boat.

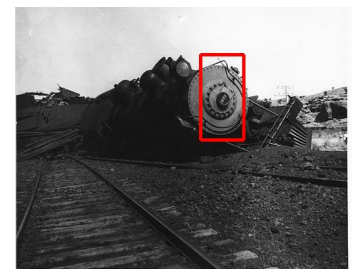
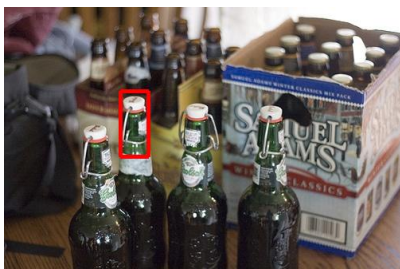
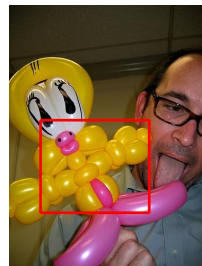
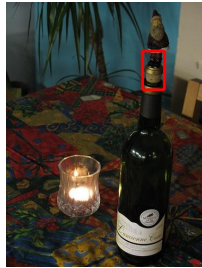
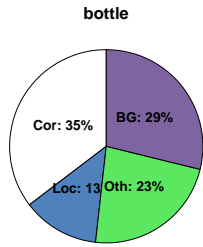


Figure 6. Failure Modes for bottle.

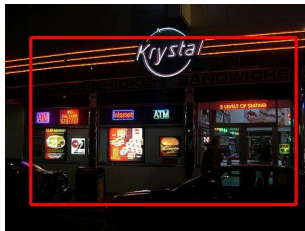
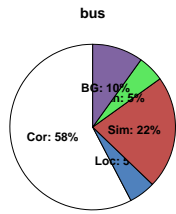


Figure 7. Failure Modes for bus.

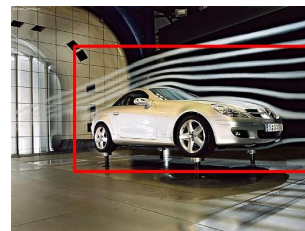
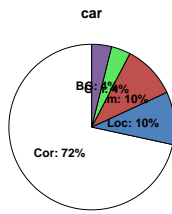


Figure 8. Failure Modes for car.

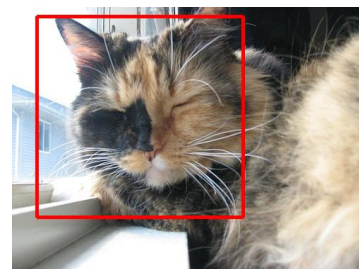
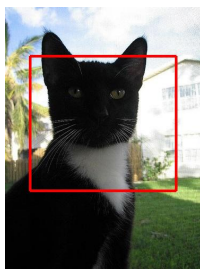
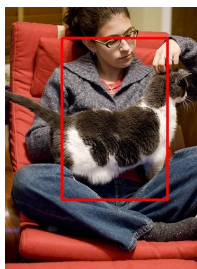
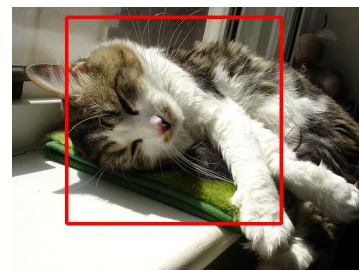
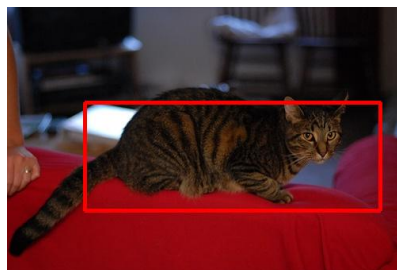
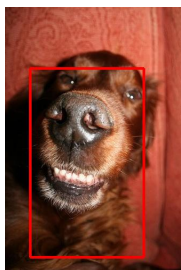
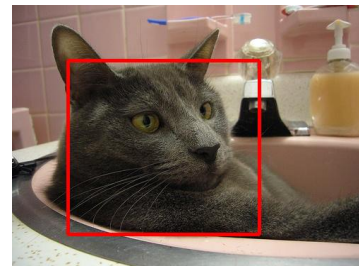
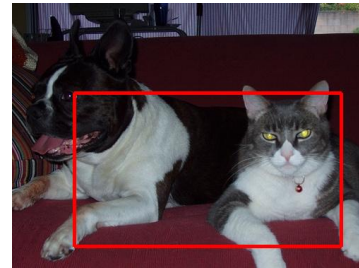
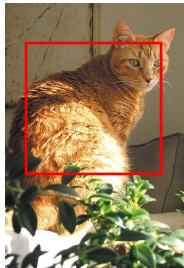
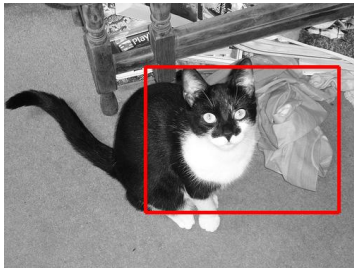
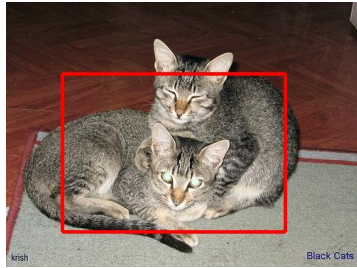
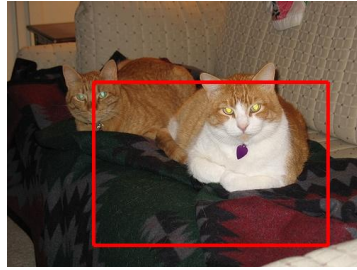
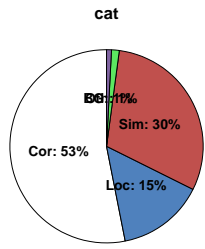


Figure 9. Failure Modes for cat.

chair

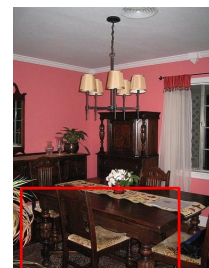
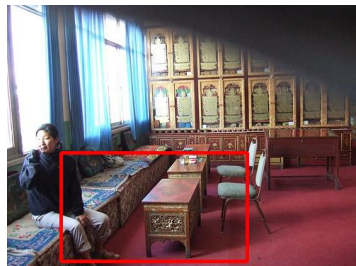
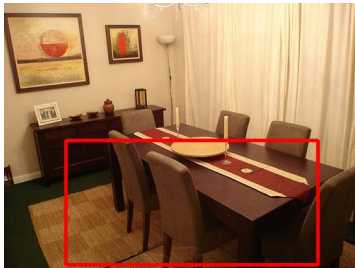
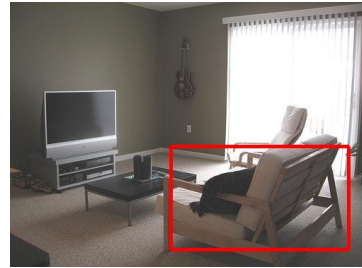
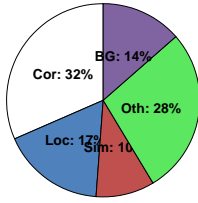


Figure 10. Failure Modes for chair.



Figure 11. Failure Modes for cow.

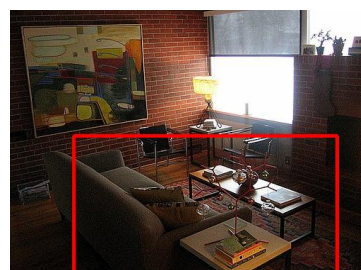
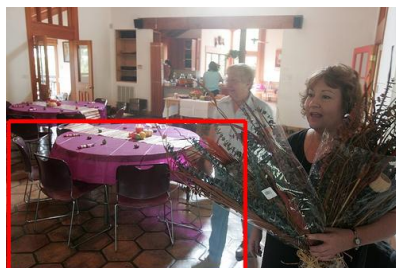
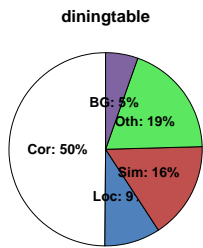


Figure 12. Failure Modes for diningtable.

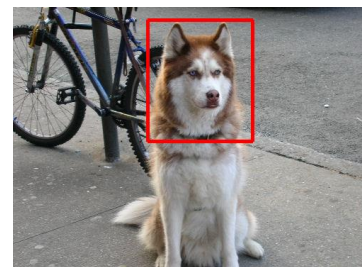
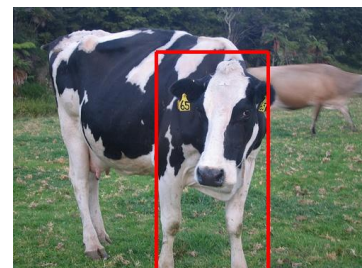
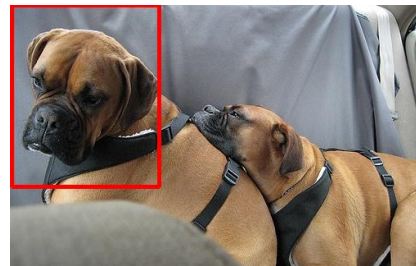
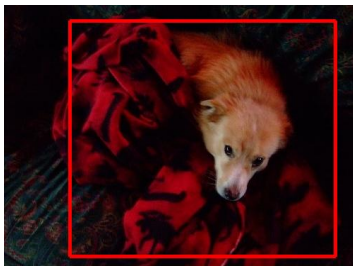
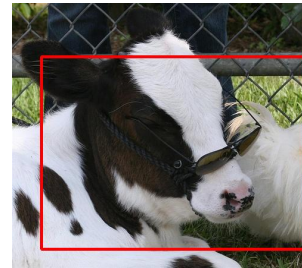
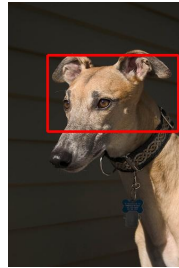
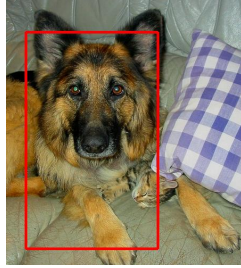
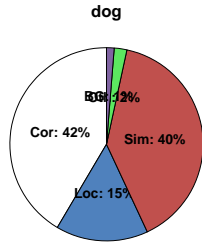


Figure 13. Failure Modes for dog.

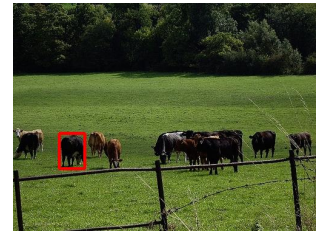
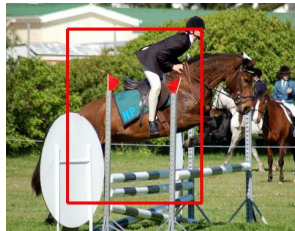
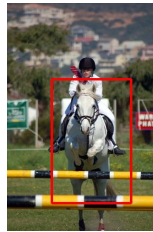
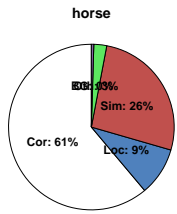


Figure 14. Failure Modes for horse.

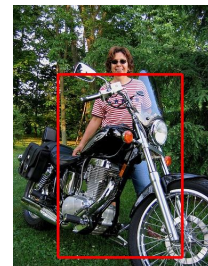
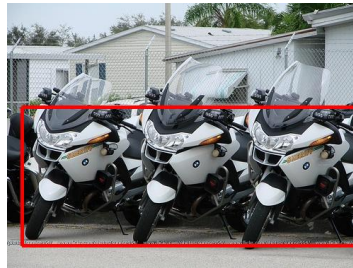
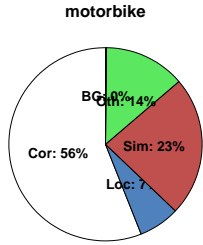


Figure 15. Failure Modes for motorbike.

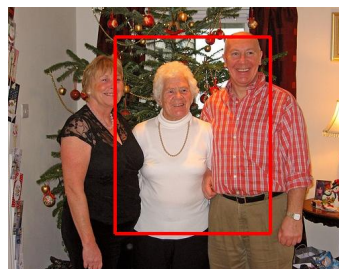
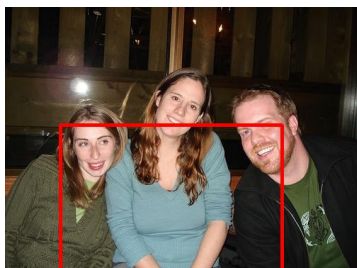
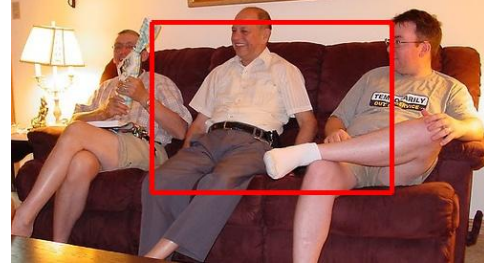
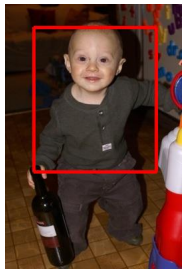
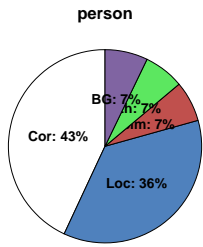


Figure 16. Failure Modes for person.

pottedplant

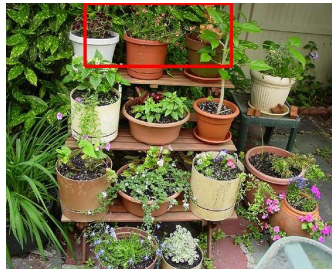
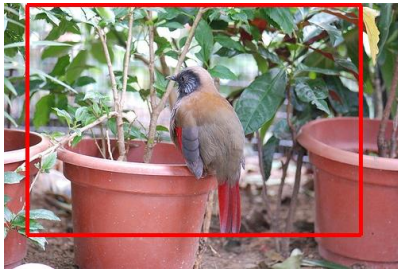
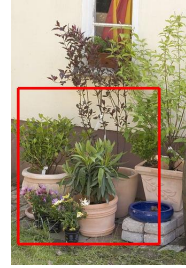
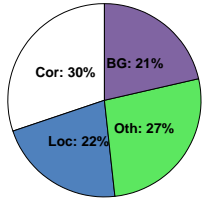


Figure 17. Failure Modes for pottedplant.

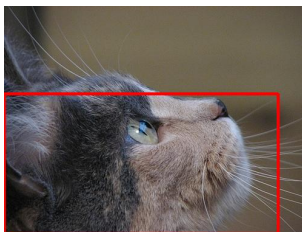
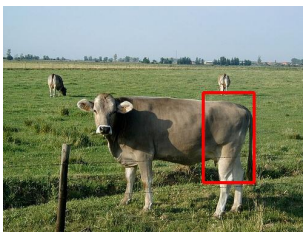
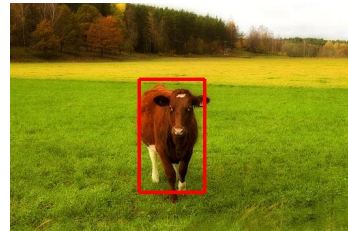
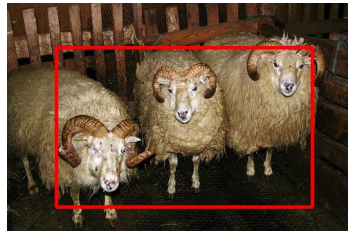
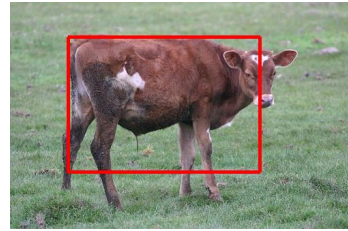
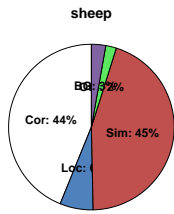


Figure 18. Failure Modes for sheep.

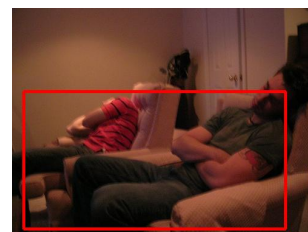
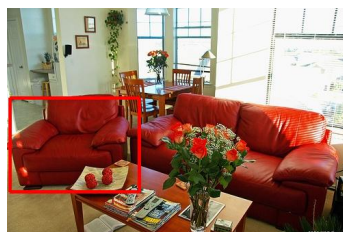
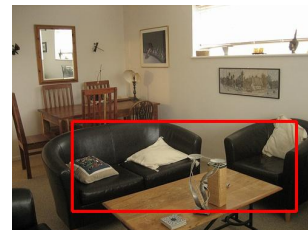
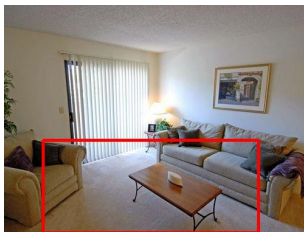
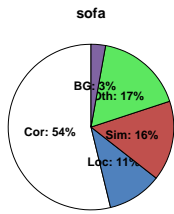


Figure 19. Failure Modes for sofa.

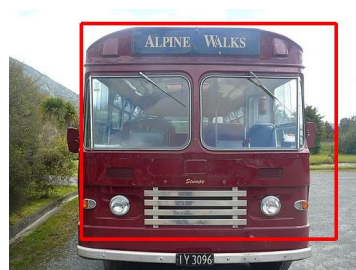
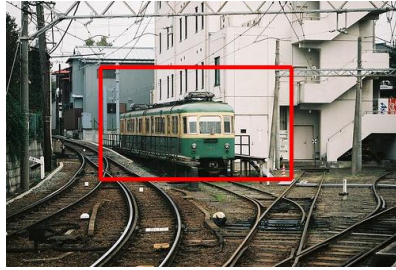
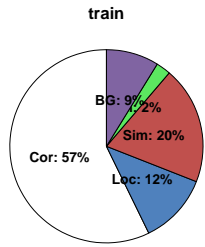


Figure 20. Failure Modes for train.

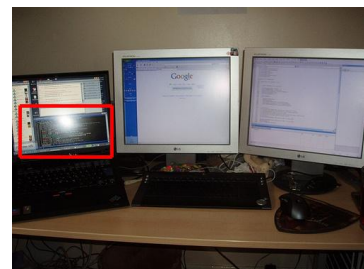
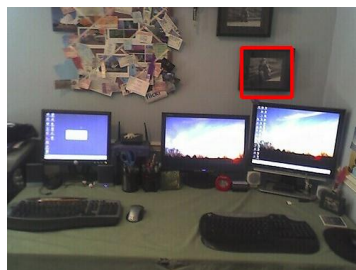
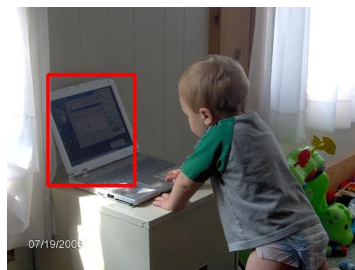
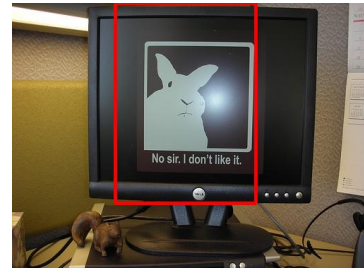
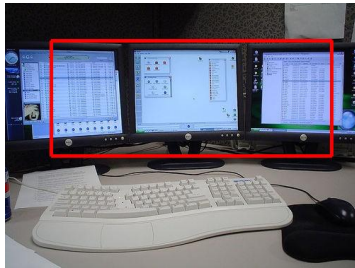
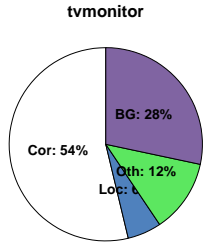


Figure 21. Failure Modes for tvmonitor.

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