Anomaly Detection and Classification

Mathematical Models and Methods for Image Processing

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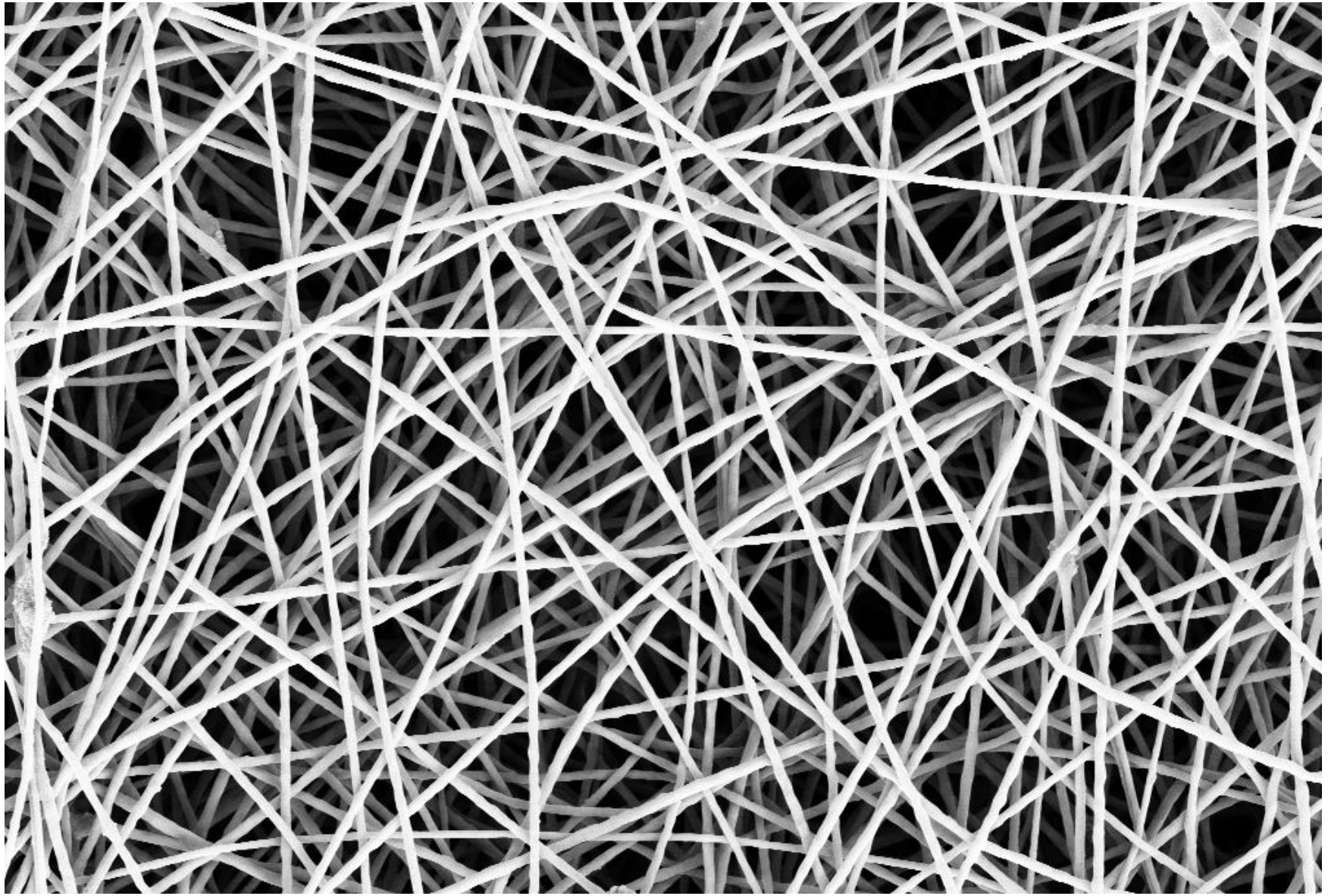
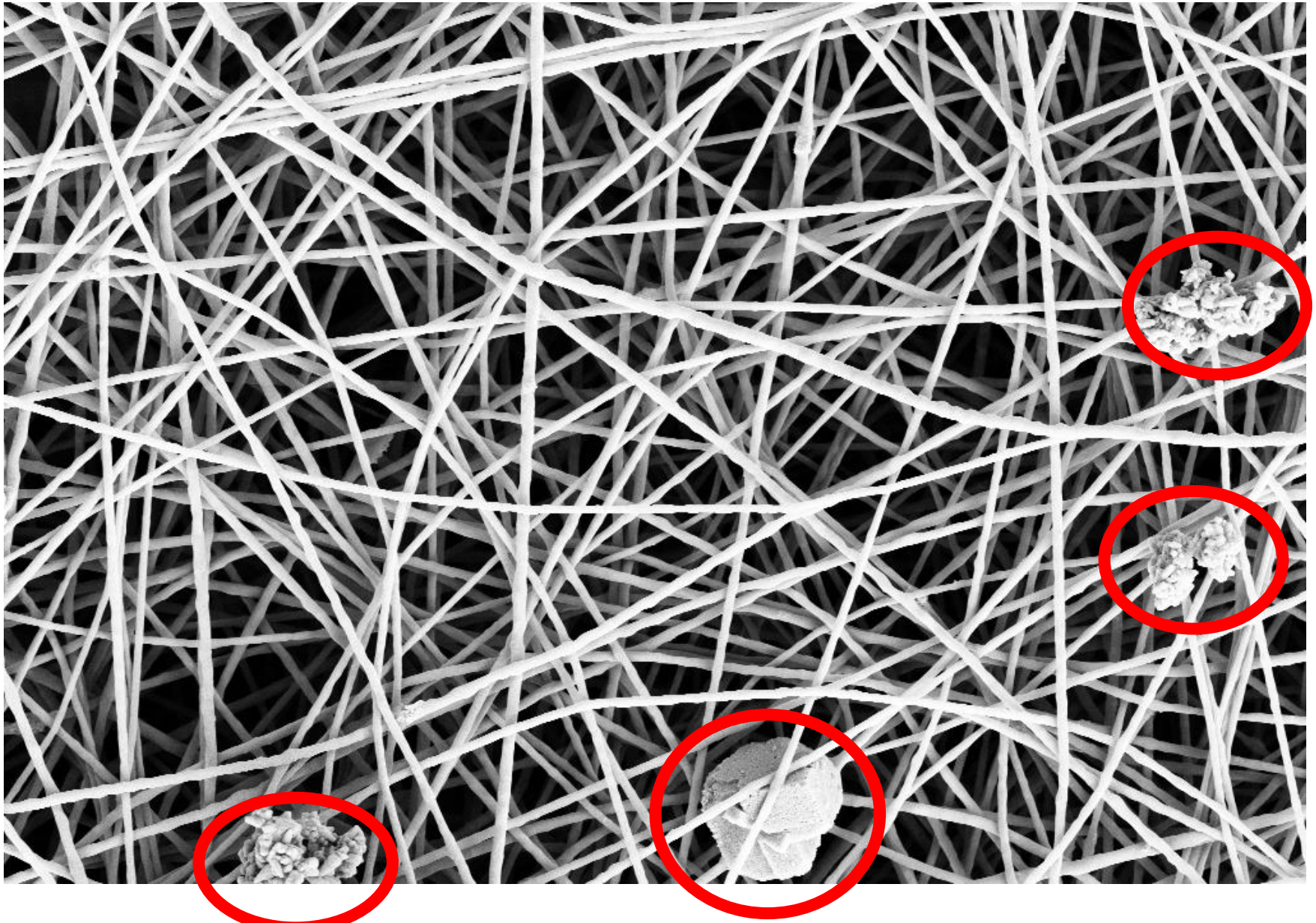
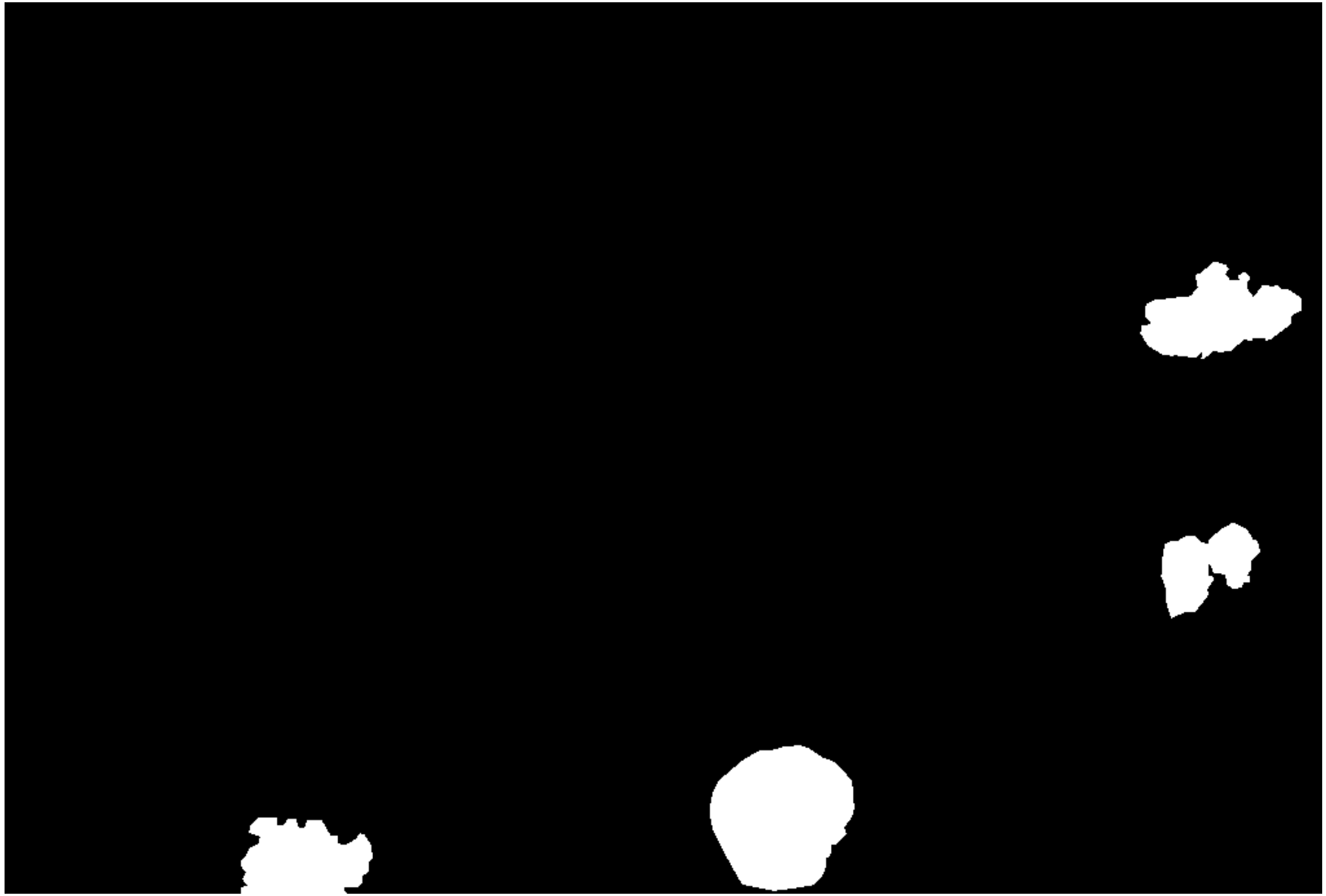
The anomaly detection problem



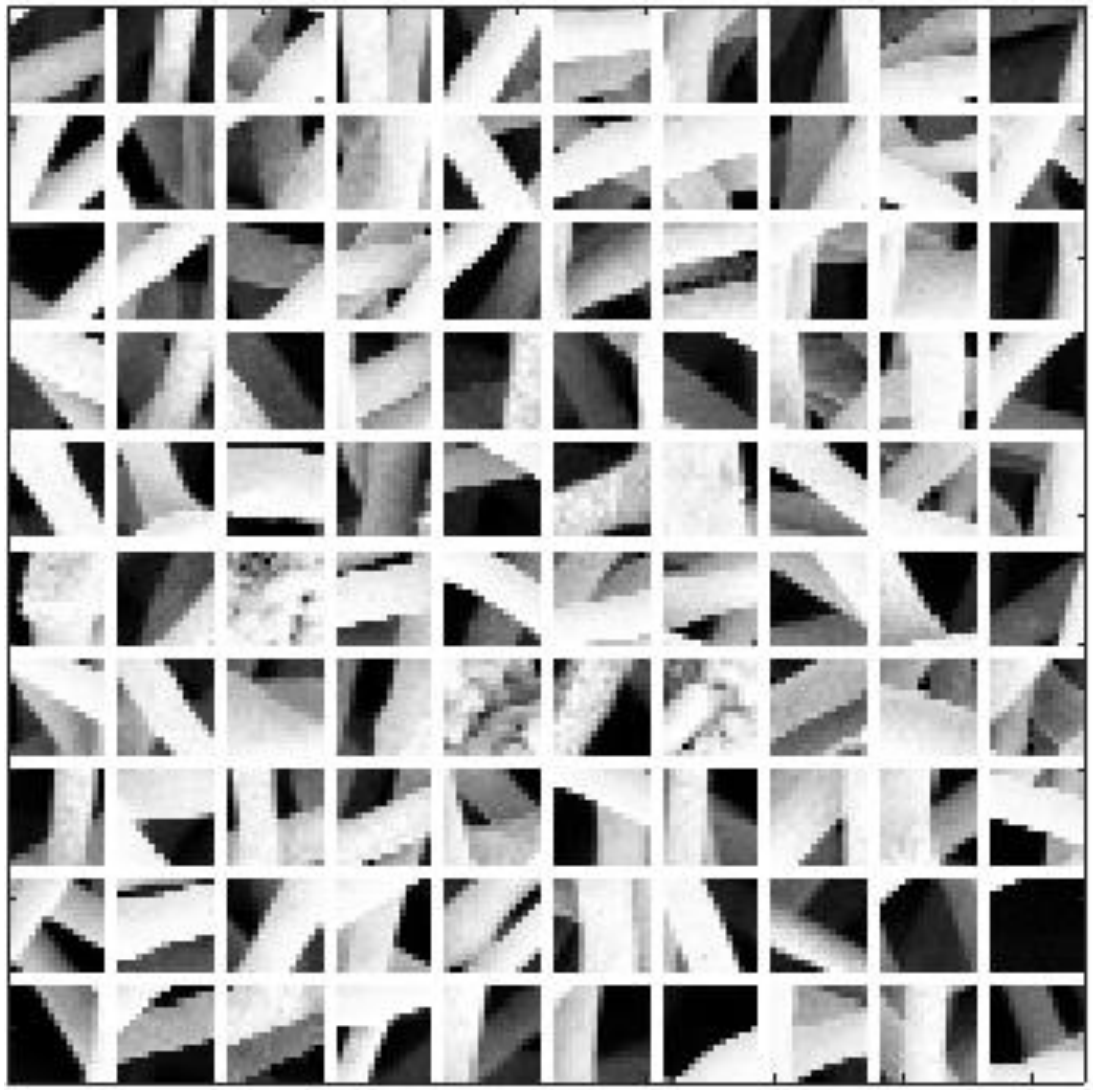
The anomaly detection problem



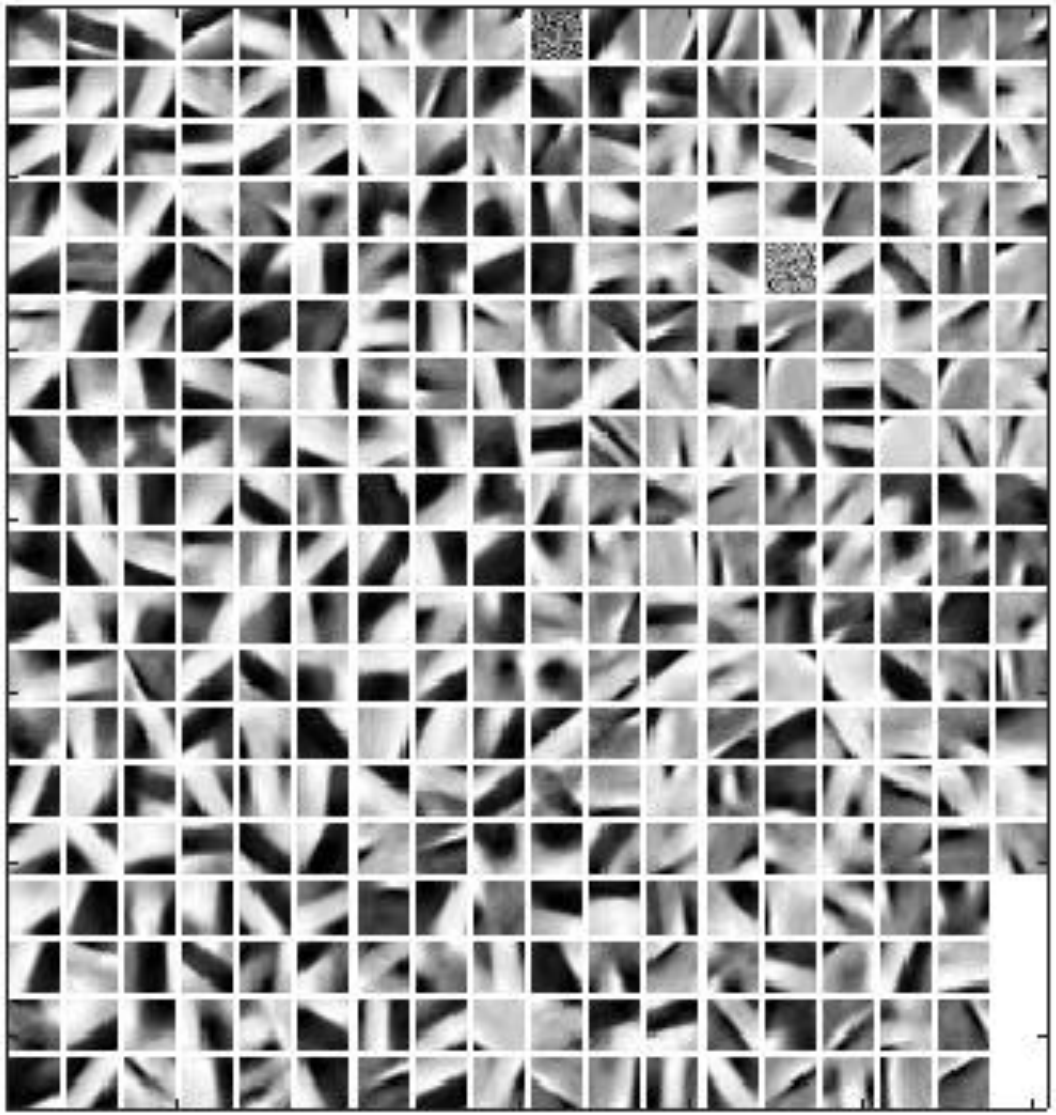
The anomaly mask



Normal Patches



Learned Dictionary



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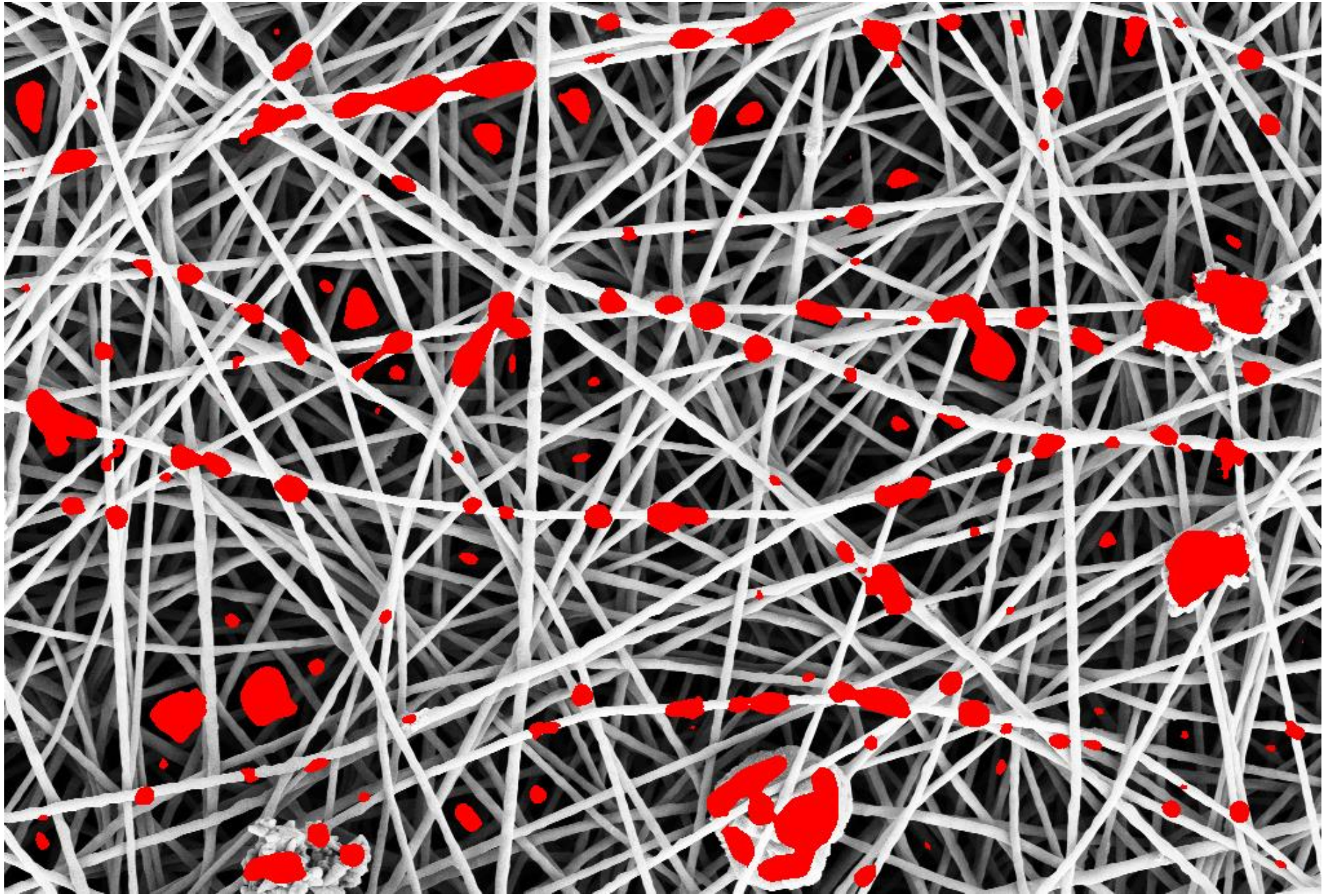
Detections



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Assignments

- Implement the anomaly detection based on l1 sparse coding
  - Use 15x15 patches
  - You can improve the results by fine tuning all the parameters
- Implement the classification based on sparse representation

References

- ADMM: Wahlberg, Bo, et al. "An ADMM algorithm for a class of total variation regularized estimation problems." *IFAC Proceedings Volumes* 45.16 (2012): 83-88.
- Anomaly Detection:
  - Carrera, Diego, et al. "Defect detection in SEM images of nanofibrous materials." *IEEE Transactions on Industrial Informatics* 13.2 (2016): 551-561.
  - Carrera, Diego, et al. "Scale-invariant anomaly detection with multiscale group-sparse models." *2016 IEEE International Conference on Image Processing (ICIP)*. IEEE, 2016.
- Classification: J. Wright, A. Y. Yang, A. Ganesh, S. S. Sastry, and Y. Ma, “Robust face recognition via sparse representation,” IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 31, no. 2, pp. 210–227, February 2009. doi:10.1109/tpami.2008.79