STQ Workshop

Acoustic Aspects Of Sound Event Detection For IoT Based Monitoring Application

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Introduction

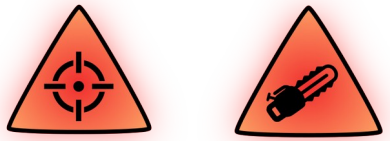
Sound categorization by source:

- Human voice
- Musical instrument
- **Environment**

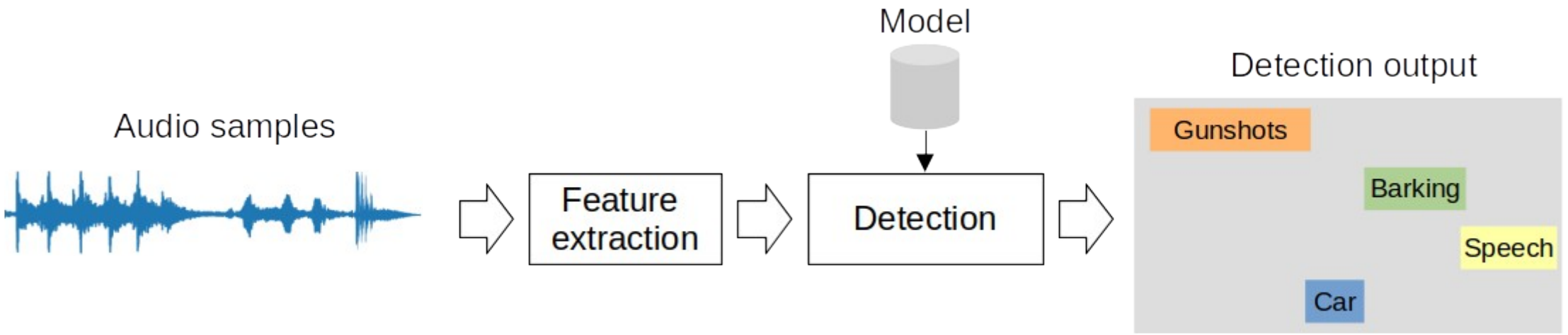
Sound categorization by time-frequency properties:

- **Acoustic event**
- Acoustic scene

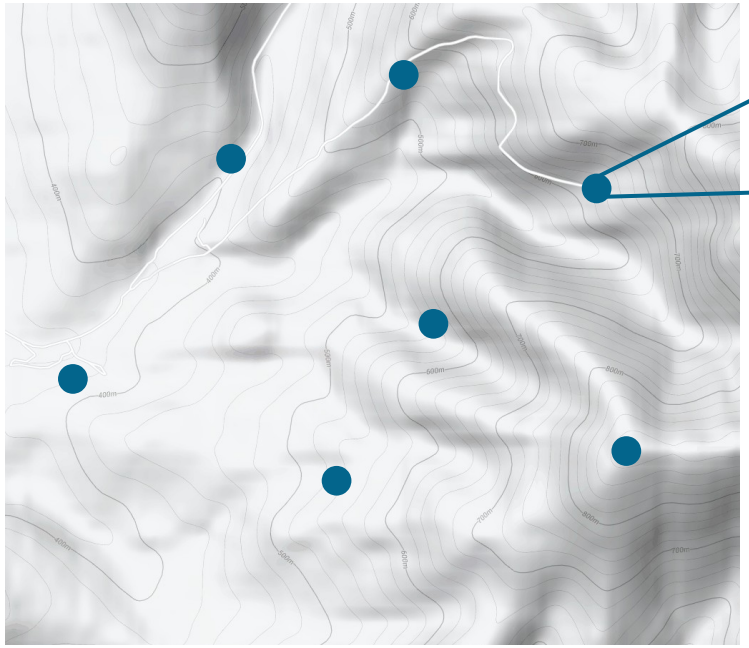
Acoustic events may provide information about illegal activity.

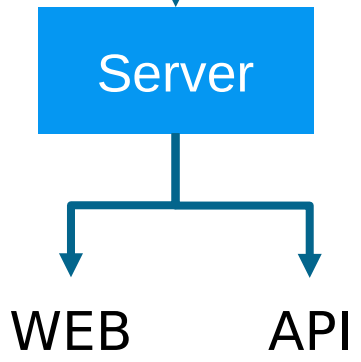


Sound event detection



Remote areas monitoring





Dataset

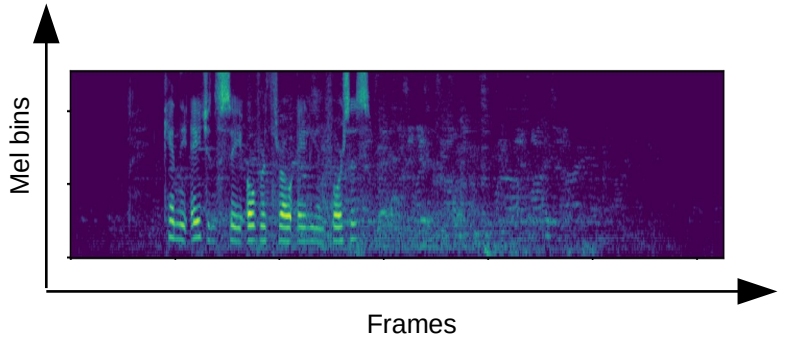
- Chainsaw recordings
  - Multiple distances (5m, 100m, 200m, 300m, 400m)
- Random background recordings
  - UrbanSound8K
  - ESC-50

- Augmentation
  - Random time shift
  - Gaussian noise

J. Salamon, C. Jacoby, and J. P. Bello, “A Dataset and Taxonomy for Urban Sound Research,” in Proceedings of the ACM International Conference on Multimedia - MM ’14, Orlando, Florida, USA, 2014, pp. 1041–1044.
K. J. Piczak, “ESC: Dataset for Environmental Sound Classification,” in Proceedings of the 23rd ACM international conference on Multimedia, Brisbane Australia, Oct. 2015, pp. 1015–1018.

YAMNet

- Pre-trained neural network
- MobileNetV1 architecture
- 521 audio events from AudioSet
- Spectrogram features

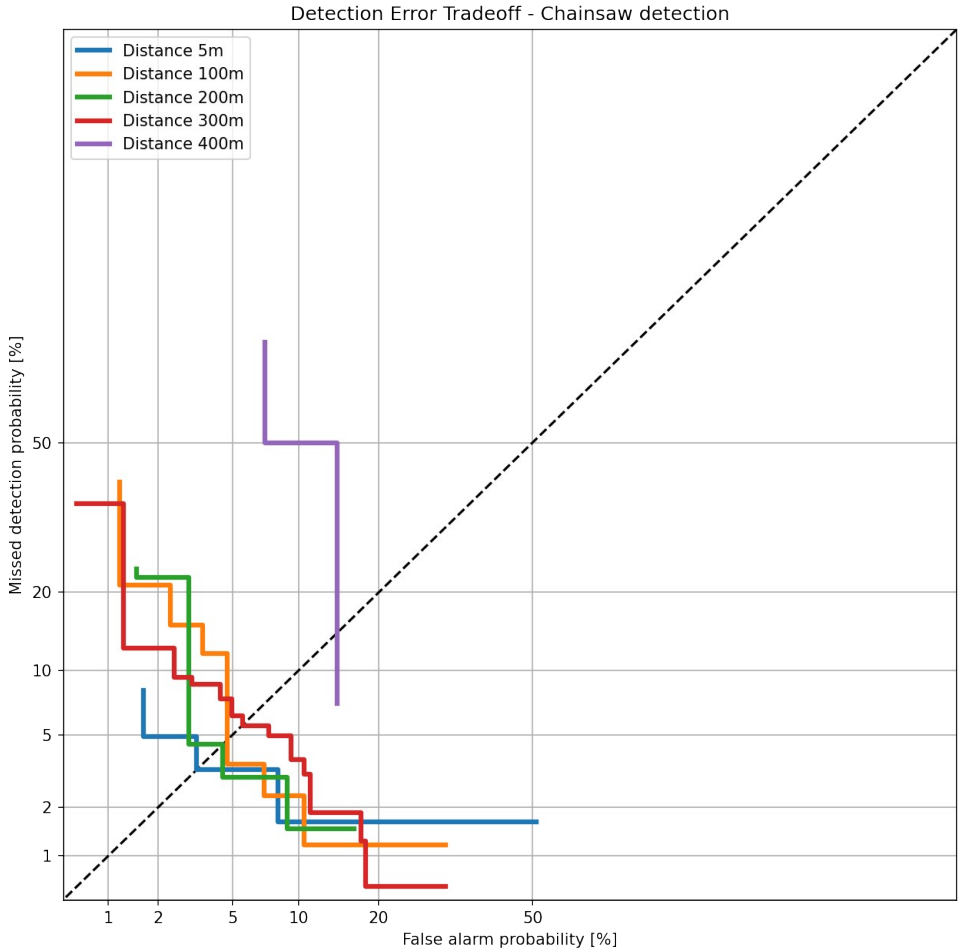


www.tensorflow.org

A. G. Howard et al., “MobileNets: Efficient Convolutional Neural Networks for Mobile Vision Applications.” arXiv, Apr. 16, 2017.

J. F. Gemmeke et al., “Audio Set: An ontology and human-labeled dataset for audio events,” in Proc. IEEE ICASSP 2017, New Orleans, LA, 2017.

Experimental results



Conclusion

- Approx. 300m is the cutting-edge distance, after which the detection performance drops significantly.
- The analysis provides us with necessary information on the density of device distribution when covering remote areas.

Thank you for your attention