Measuring Stereotypy
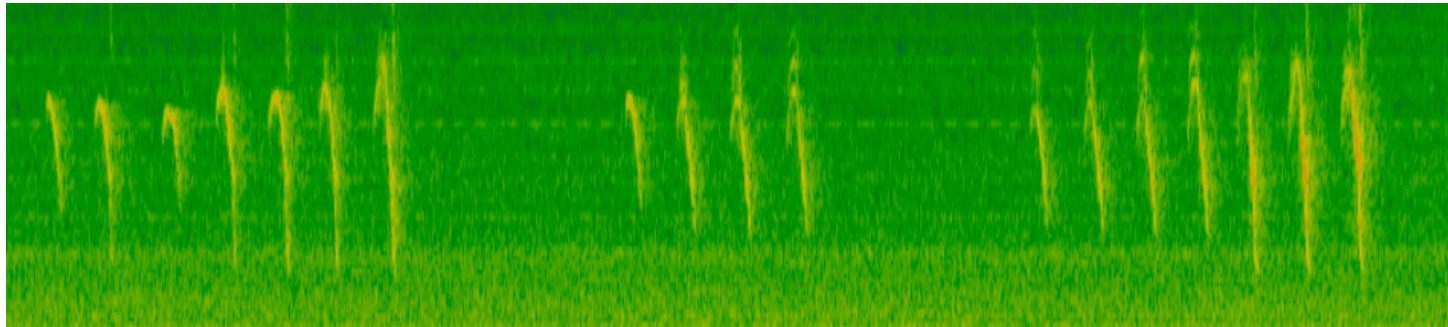
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27 April 2023

Stereotypy:

- **Repetitive behavior**

- Associated with abnormal behavior in animals (stress, pain etc.)

- Often used to describe the repetitive behaviors of people in the autistic spectrum.

- Repetitive acoustic patterns
  - Stereotypes

The DCASE Few-shot task

From only 5 examples of a target class, can we develop systems able to detect all events of that class?
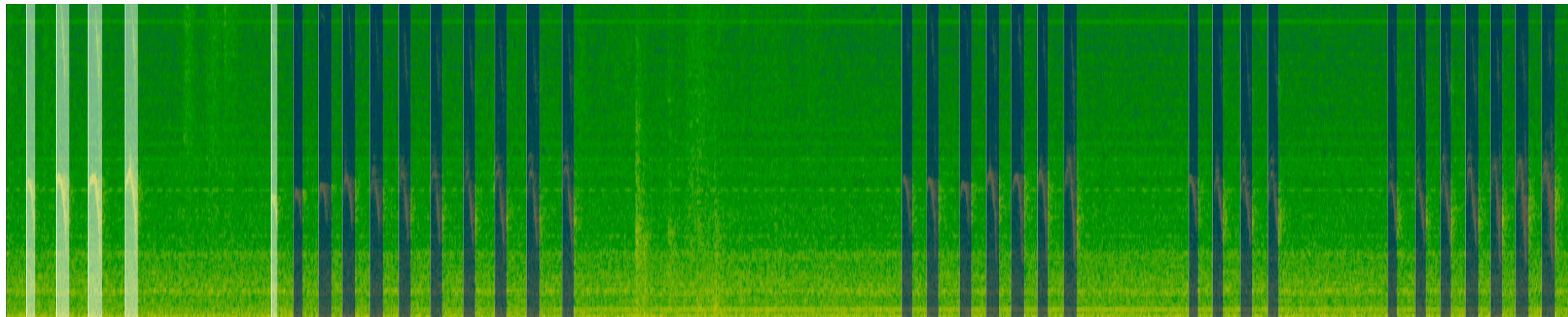
Training Set
- Multispecies flight calls
- Jackdaw calls
- Western Mediterranean Wetlands Bird calls
- Hyena
- Meerkat

Validation Set
- Poland bird flight calls
- Meerkat stationary mics
- HumBug (mosquitos)

Evaluation Set
- Manx Shearwaters
- Chick calls
- Biotopia dawn chorus birds
- Coati (south American mammal)
- Chernobyl TREE (chiffchaff, cuckoo)
- Dolphin calls (underwater)

Dataset dependencies analysis

- Analyzing the results of the participating systems considering the characteristics of the datasets.

  - SNR
  - Density/sparsity events
  - Mean event duration
  - **Stereotypy – how stereotyped are the calls?**

Proposed metric

- How to measure similarity between events
    - Cross correlation between 2 events has its maximum when patterns completely align.
        - This can be applied on spectrograms!
            - Python skimage.feature.match_template()

    - Select T Templates
    - Select 30 Events (red)
    - Pairwise cross correlation between event and template
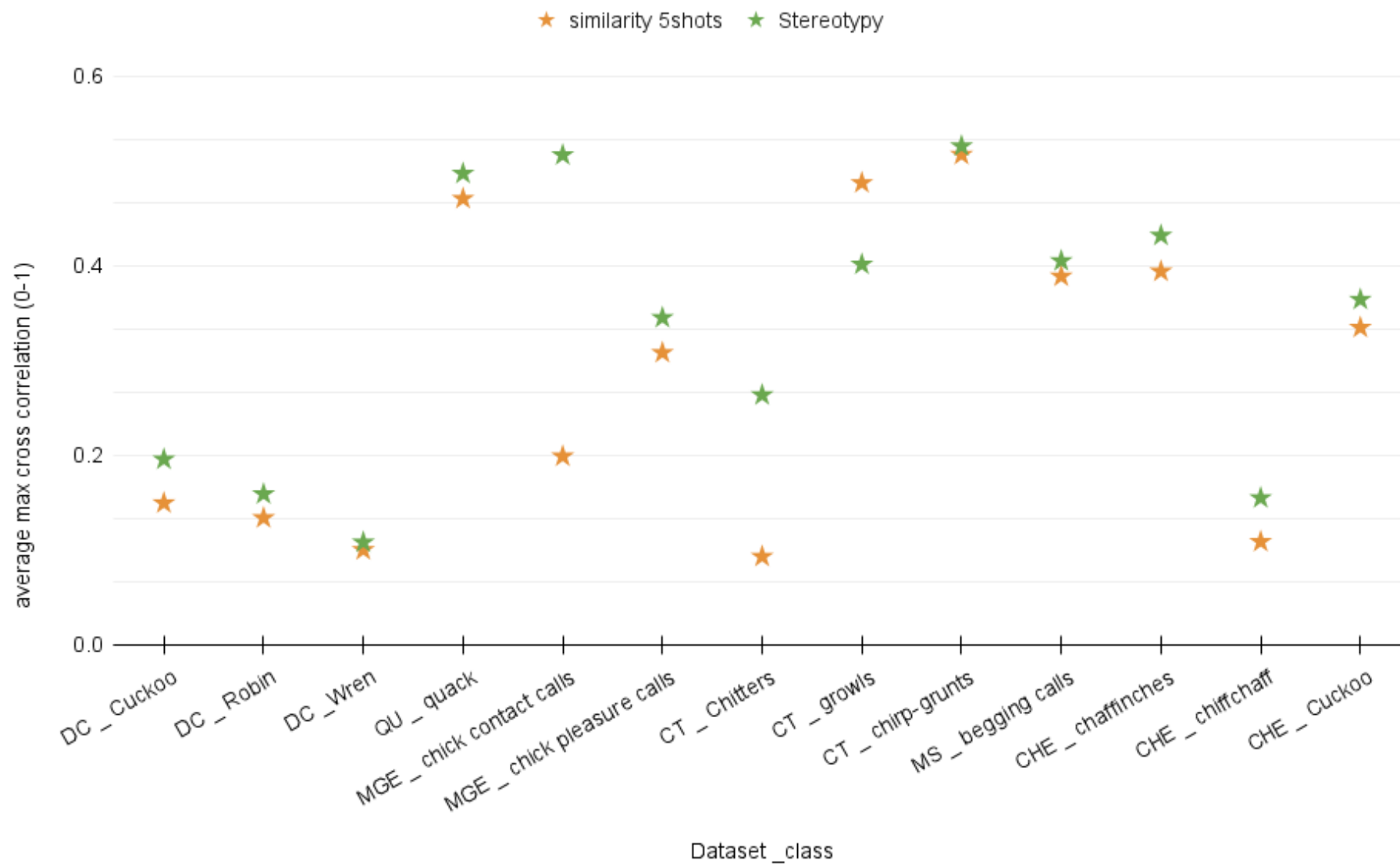
$$sim(t, e) = max_k [xcorr(stft_t, stft_e(k : k + L))]$$
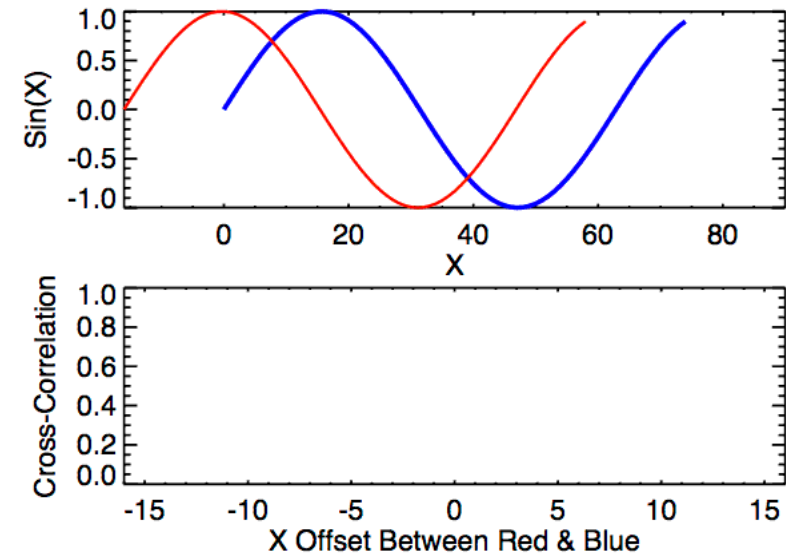
- Get an averaged similarity value:

$$\frac{1}{T} \sum_t^T \frac{1}{30} \sum_e^E sim(t, e)$$

Some results:

$$\frac{1}{T}\sum_{t}^{T}\frac{1}{30}\sum_{e}^{E}sim(t,e)$$

★ similarity 5shots   ★ Stereotypy

Limitations/ discussion

- Events stretched on the temporal axis will have low similarity.
    - Other similarity metrics?
    - What are the important aspects that define similar events?

- Is the change of the temporal profile of stereotypy important?
    - Random selection of our "templates" and POS events wouldn't work.