Weekly Report

Wangwon Lee, 2019/05/04

This week

- **Activation Maximization**
  - Apply AM to the other model
- **Class Activation Map**
  - What is CAM
  - Apply CAM to 1D model

Next week

- **Mapping the brain**
  - To study the brain
  - AFNI
  - RDM matrix
  - Extract feature for mapping

Interesting and new finding

- Visualization
- Class Activation Map (GradCAM)

The aim of this month / Discussion

- **The aim of this month**: To study brain data.

Previous Work – ch32 model

- X axis: each filter (sorted by most highest frequency of each filer)
- Y axis: frequency

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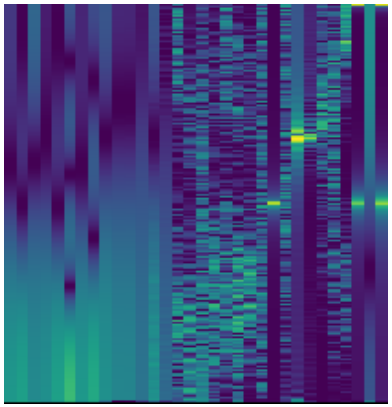

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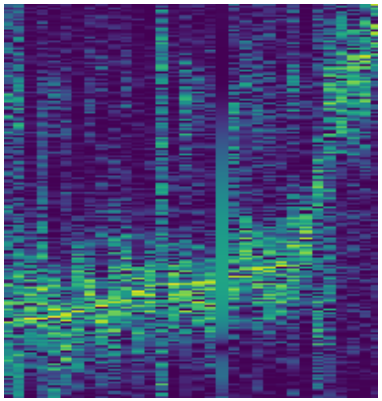

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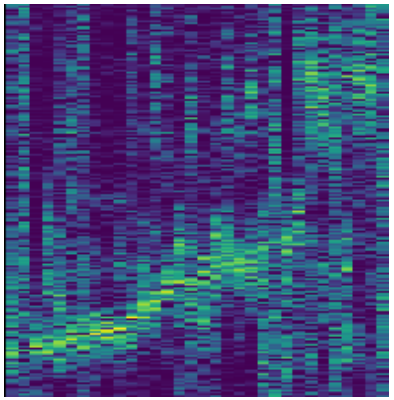

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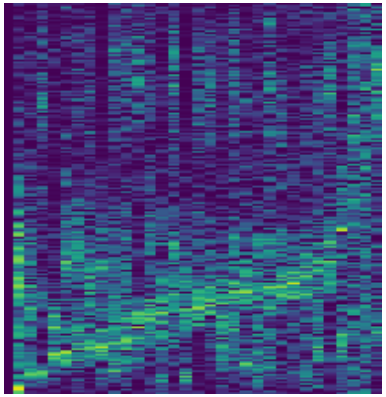

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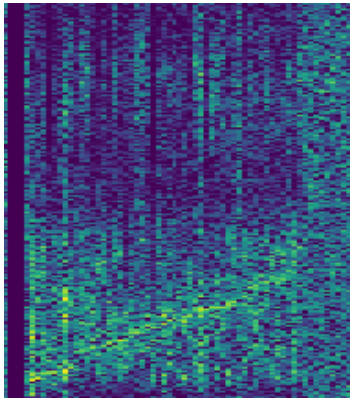

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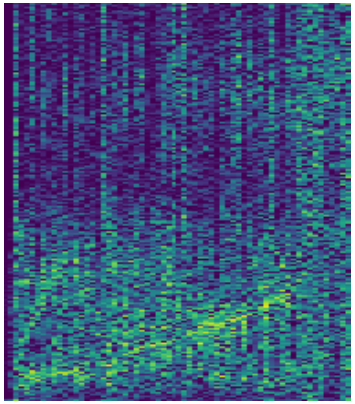

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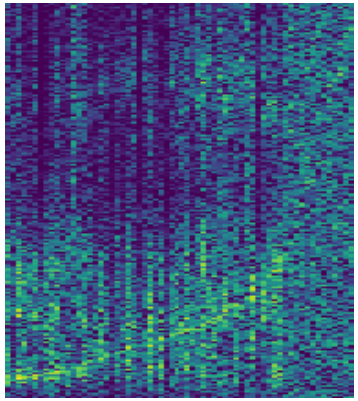

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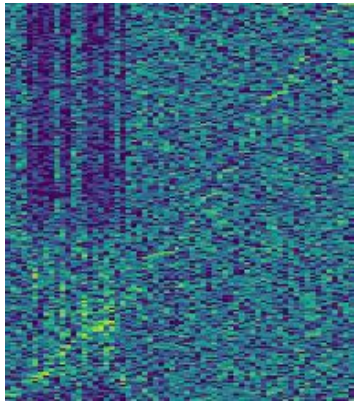

Activation Maximization – ch64 model

- It is very similar to the previous results

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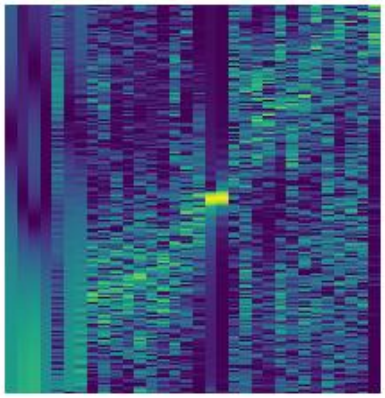

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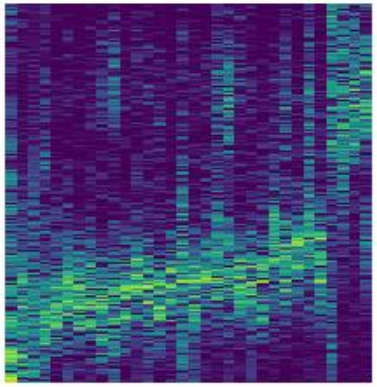

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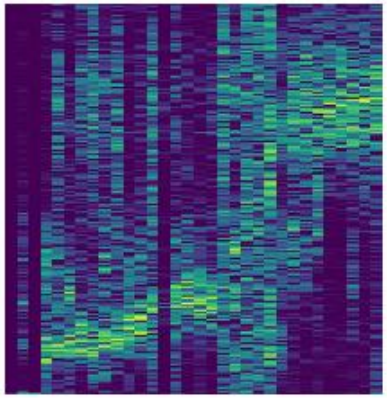

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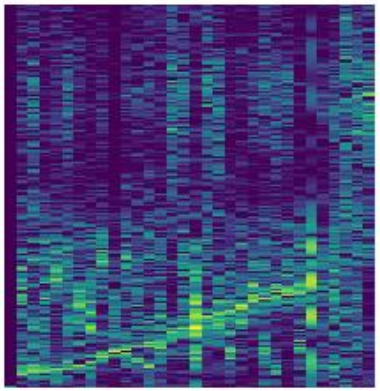

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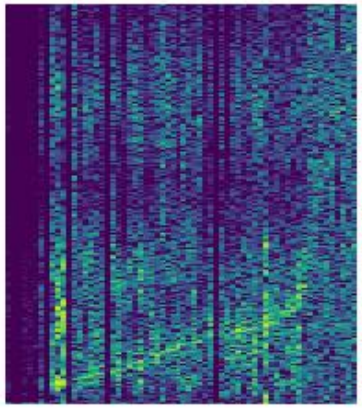

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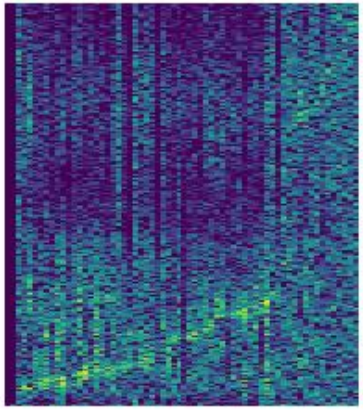

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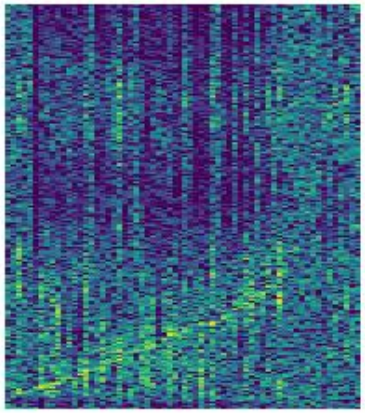

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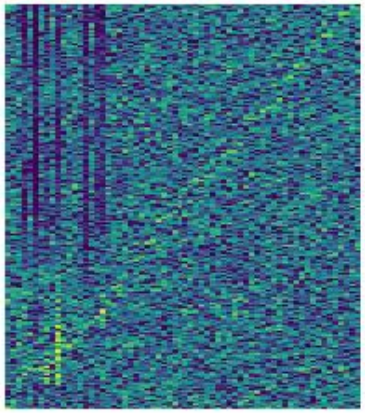

Activation Maximization – VGG like model

- It is also very similar to the previous results
- But I couldn't why the result is noisy…

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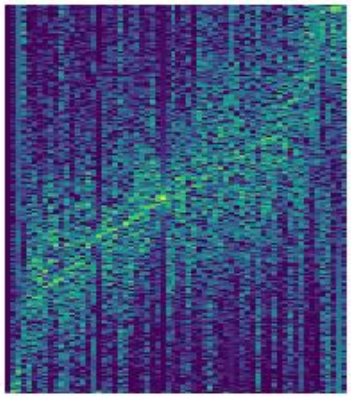

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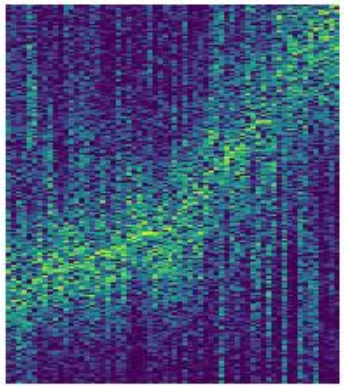

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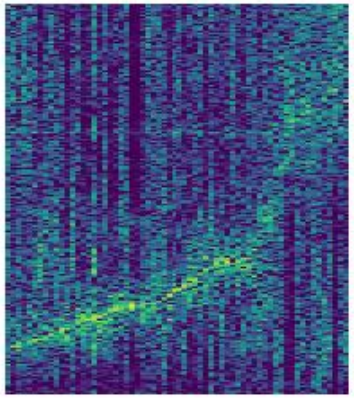

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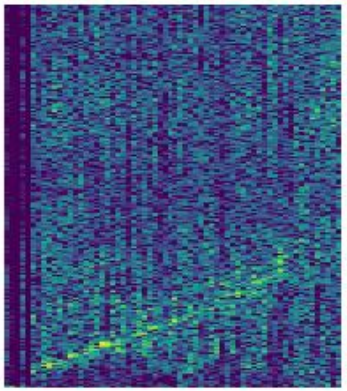

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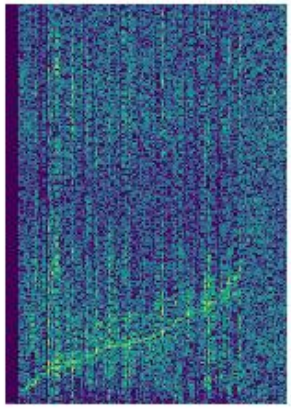

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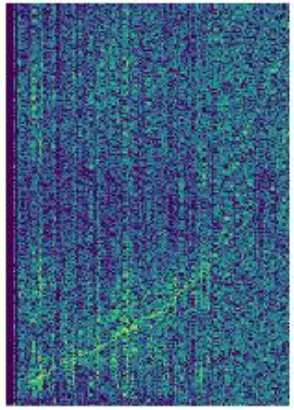

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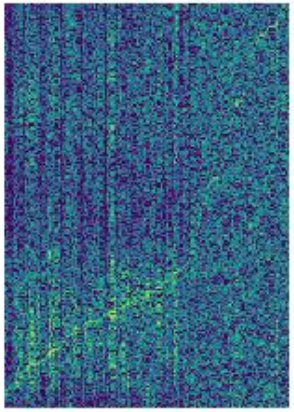

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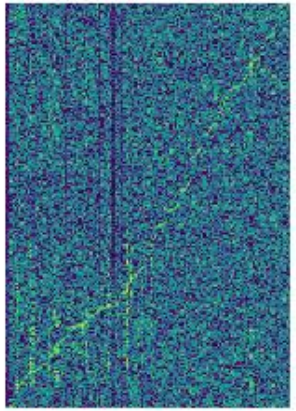
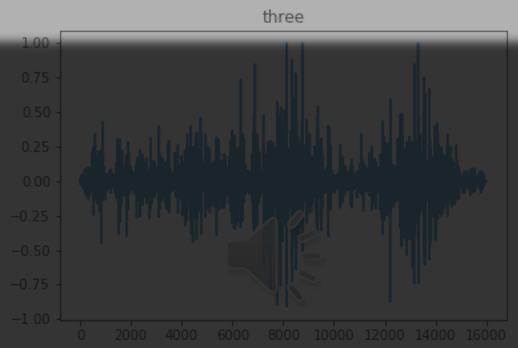
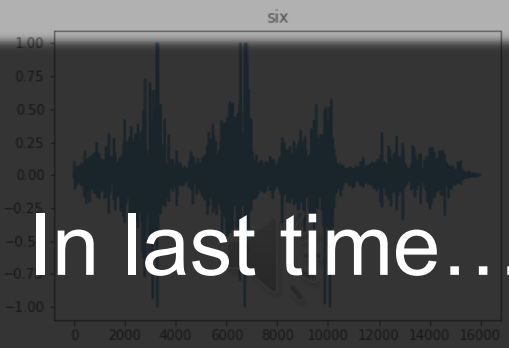
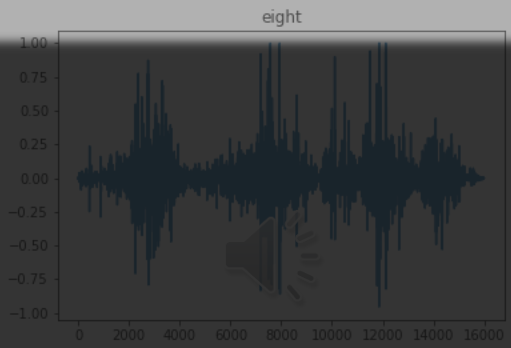


AM in 1D Model – output layer

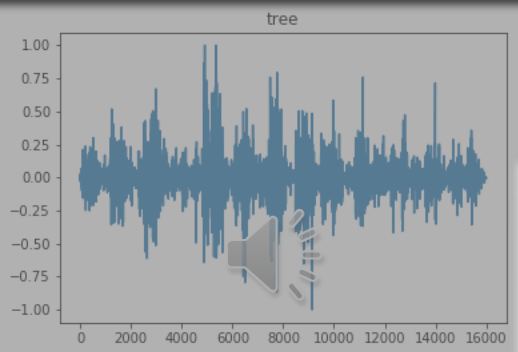
- It seems like real sound waveform
- What if we listen that?

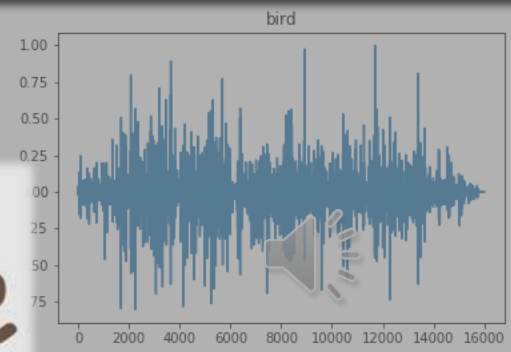






In last time…





What is CAM(Class Activation Map)

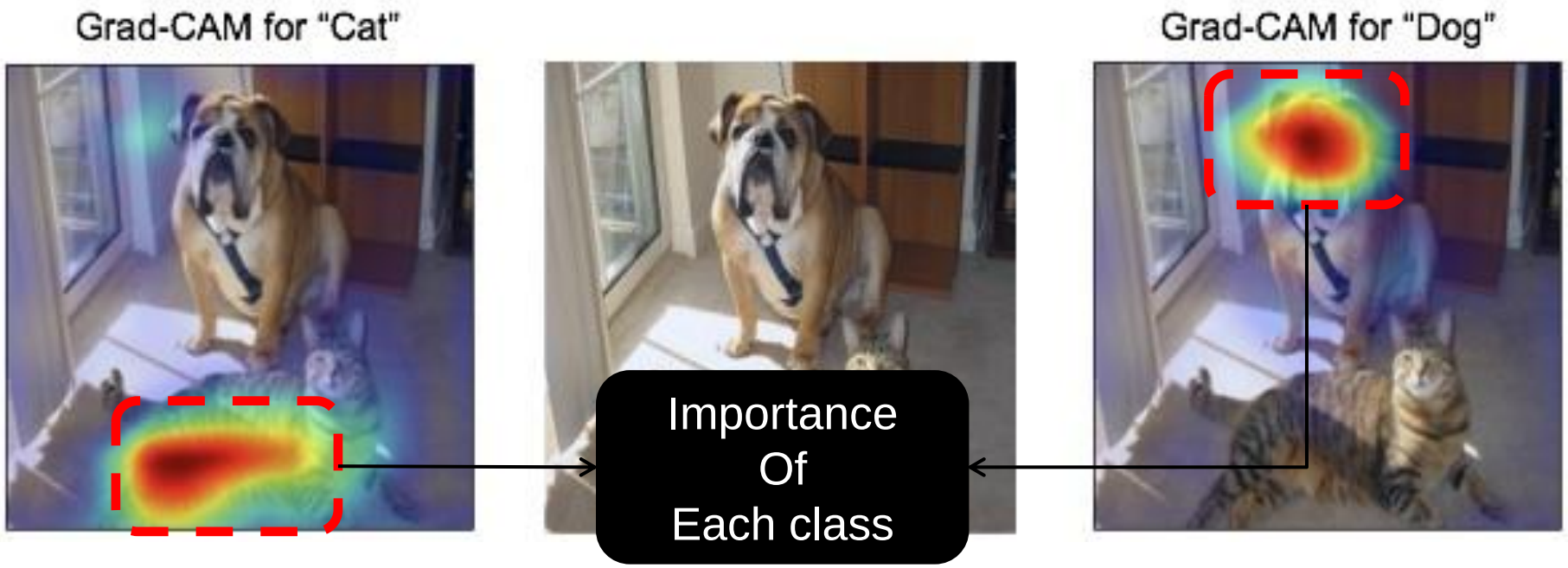
- Class Activation Map (also known as ‘attention map’).
- The CAM visualizes where each class is focusing on.
- Multiply the last convolution layer’s gradient and feature map

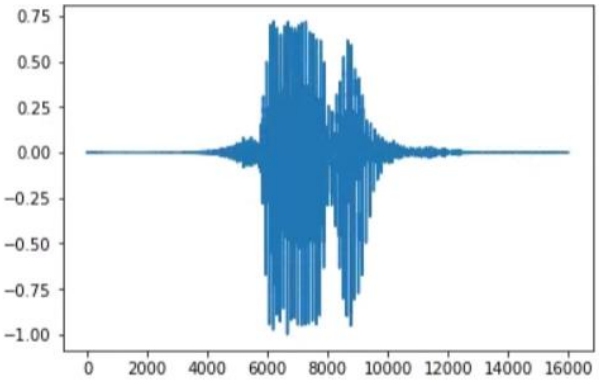
$$L^c_{\text{Grad-CAM}} = ReLU\underbrace{\left(\sum_k \alpha_k^c A^k\right)}_{\text{linear combination}}, \quad a_k^c = \frac{1}{Z}\sum_i\sum_j \frac{\delta y^c}{\delta A_{ij}^k}$$

Grad-CAM for “Cat”

Grad-CAM for “Dog”

CAM – Apply 1D model



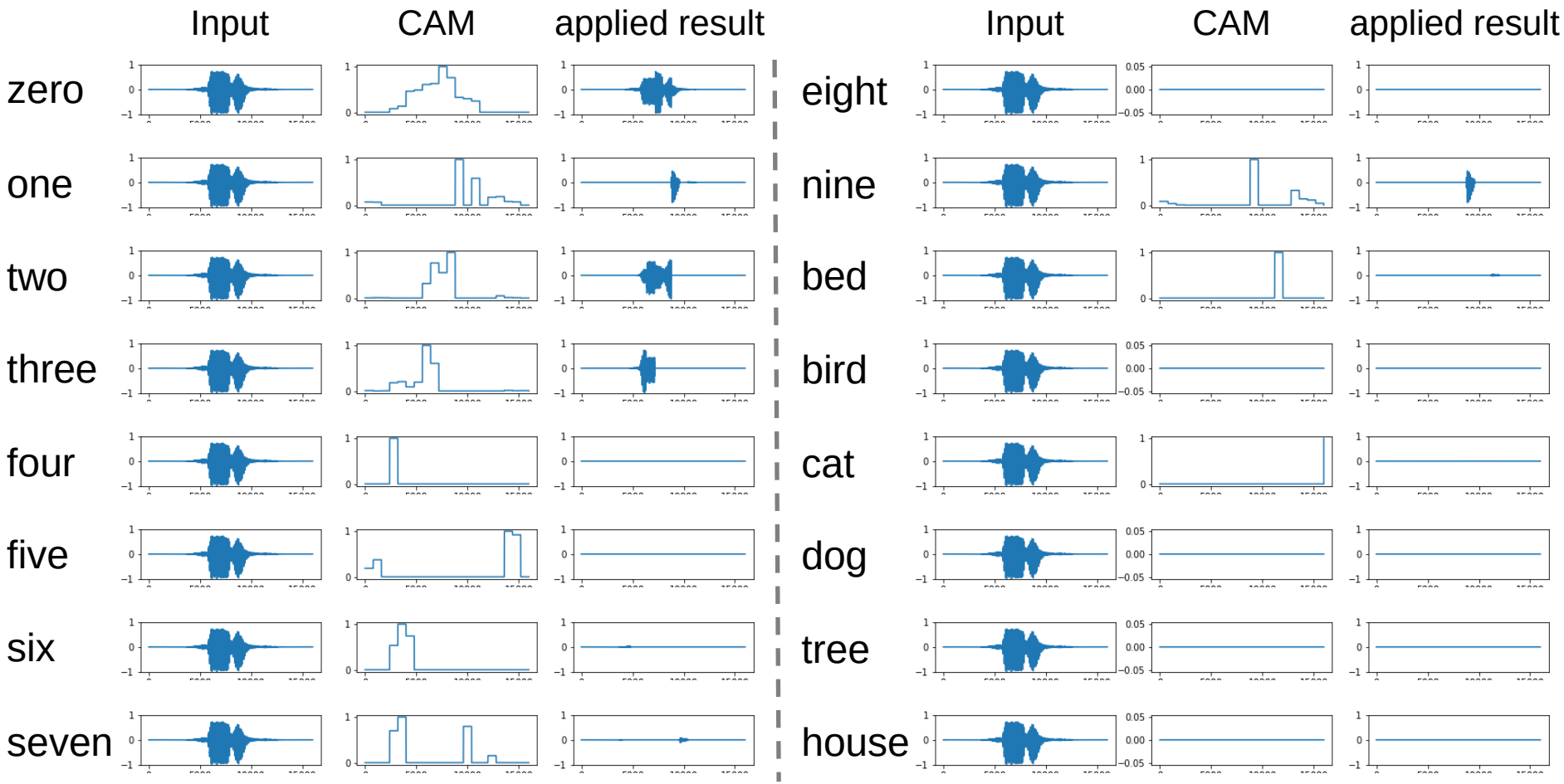


Using
CAM

Highlighted
Result

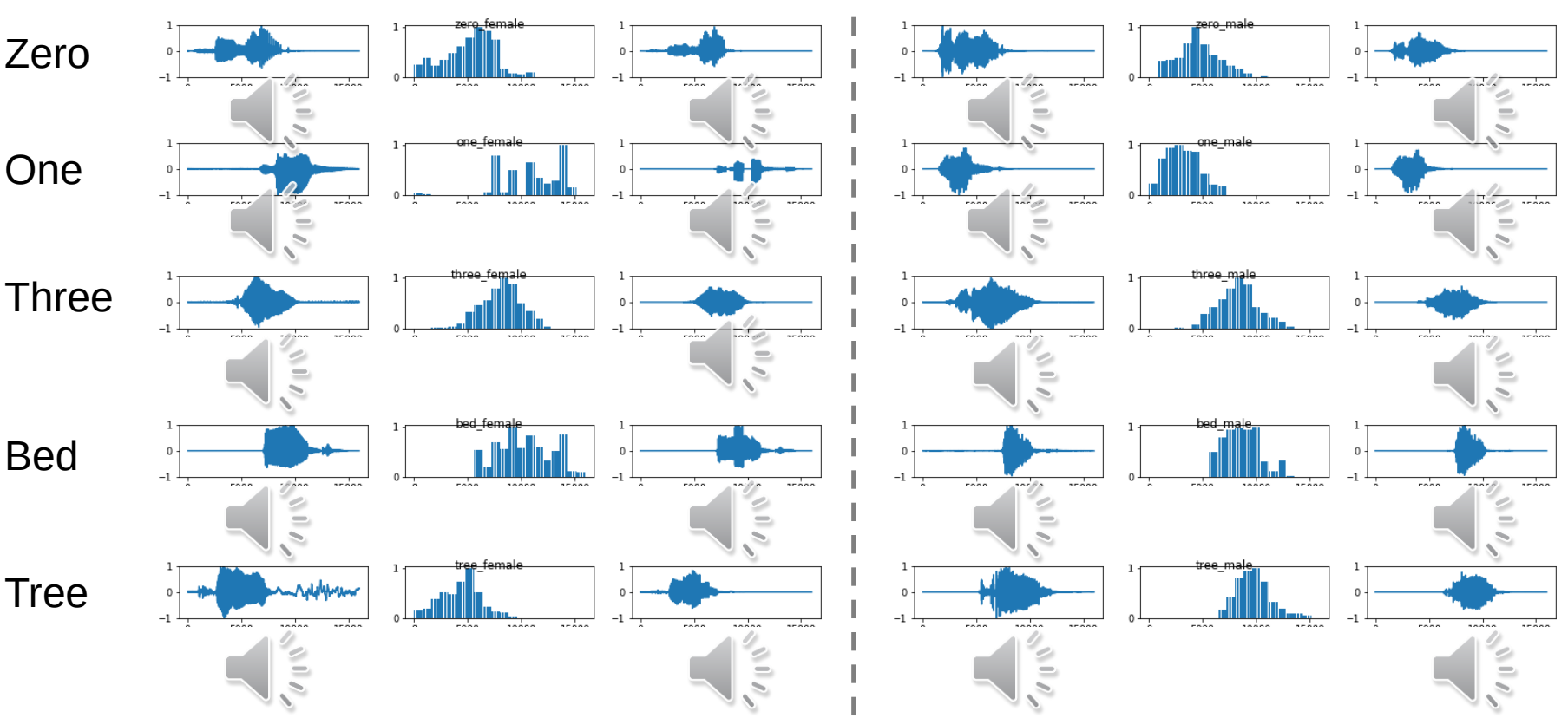
CAM – Example “Zero”

- The attention represent original data only for the corresponding class.
- In corresponding class, the result focus on overall, But the other is not.



CAM – Target attention

- Make CAM for each class.
- As I expected it, the most of result focus on overall input.
- As the result, the model focus on unvoiced sound than voiced sound.



Any Question?

Thank you