

Image Processing – 67829 – Exercise 2

Due Date: 5.2 at 23:59

Version 2.0 - Last Update 28.01.2024

1 Task

In this exercise you will perform audio denoising using the material taught in class. In the Moodle, under "Exersice 2" -> "Exercise Inputs" (found here) you are given 2 audio files(4 kHz sampling rate) each noised in a different way.

Note 1: Solutions might have some shared steps

Note 2: You are not given the clean audio, and we do not expect your denoising result to match the original clean audio (just remove the annoying disruption)

Note 3: Your algorithm can be specific for the two provided audios(and not for similar noises, other noisy audios etc.)

2 Submission

Submission instructions are given in the "Submissions Guidelines" document published on the course web page. Please read and follow them carefully. Any update to those guidelines will be posted in the news forum, so be sure you follow the forum.

Your code should follow the below API (you are welcome to extend it however much you like, but you must follow the API.

```
def q1(audio_path) -> numpy.array:  
    """
```

```

:param audio_path: path to q1 audio file
:return: return q1 denoised version
"""

def q2(audio_path) -> numpy.array:
    """

    :param audio_path: path to q2 audio file
    :return: return q2 denoised version
    """

```

When submitting your solution to the Moodle, a **basic** presubmission script will check that your code executes and finishes with no errors.

Note: A final submission which fails to pass the presubmission test will start its grade from 70, we will not accept appeals related to failing the presubmission test.

2.1 Report Guidelines

In addition to the code, you should submit a report describing your solution. The report must follow the following structure and address the topics below. We provide a template **here** for such a report. Note you are not obligated to use it, but in case you choose not to use it, please maintain a similar structure (font size, sections, number of pages, etc.):

1. Introduction

- In your own words, state the goal of the exercise and what was the main tool you've used to solve it.
- Specify the main differences between the two noises and how these may affect the approach.

2. Algorithm

For each audio include

(a) Description

- Clearly describe the steps involved in your denoising algorithm.

(b) Implementation

- Describe your implementation of the algorithm.
- Specify the parts the you implemented from scratch and those that you've used functionality from an existing library.

- Describe (and justify if not common) any necessary hyper-parameters, thresholds, or other choices used in your algorithm.
- Discuss any challenges faced during implementation and how they were addressed.
- Include figures and visualizations that support the choice of your algorithm

3. Conclusion

- Summarize your key findings and insights.

2.2 Submission Guidelines

Your final submission should be a tar file containing a pdf named "ex2.pdf", a python file named "ex2.py" and a virtual environment requirements file "requirements.txt" . To create a tar file you can run the following command:

```
tar -cvf ex2.tar ex2.py ex2.pdf requirements.txt
```

3 Grading

Your exercise will be graded based on a manual inspection of your report (and code). We might also run automatic tests, and then the grade breakdown will be up to 20% for the automatic tests. As mentioned above, a final submission which fails to pass the presubmission test will start its grade from 70, we will not accept appeals related to failing the presubmission test.

Good luck and enjoy!