

Immersed in the Sounds of Space

Team

Solo Squad

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Outline

- Sonification
- Data from Space
- Solution Algorithm
- App Working
- App User

Note :: Question and Answers Session is at the END.

Please write down your questions.

DON'T interrupt during presentation. Thanks !

Sonification

Sonification is the process of representing data or information through sound.

Space data translates astronomical information into audible sounds, enabling aural exploration of the cosmos.

Data from Space

Electromagnetic Waves

Gravitational Waves

Plasma Waves Cosmic

Microwave Background (CMB) Radiation

Solar Wind Waves

Magnetospheric Waves

Solution Algorithm

The **Input Data** should be a Tensor

Slicing each Dimension of data

Cropping Square from each Dimensions

Computing Mean from each Square

mean = (Sum of all pixels intensity) / (Total pixels)

Continues ...

Solution Algorithm

Applying Min-Max on Mean of Square

$$\textit{normalized_mean} = (\textit{mean} - \textit{min_val}) / (\textit{max_val} - \textit{min_val})$$

Instrument Sounds

$$y(t) = A \sin(2\pi f t + \phi)$$

Continues ...

Solution Algorithm

Choosing Instruments

```
closest_amplitude = min(amplitudes_i, key=lambda x: abs(x - mean))
```

Sound Append Sequently

Exported as **.wav** file.

Algorithm End...

App Working

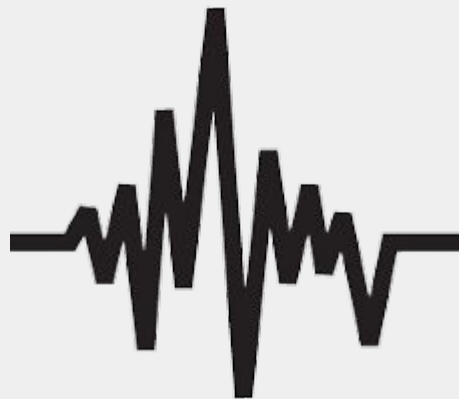
This is CLI Executable

Use following command line arg to run

main.exe *file_path size_of_square*

speed_of_audio amplitude

show_summary



Continues ...

Command Line Arguments

Arguments	Range and Limits
file_path	String Complete file path like ./images/example.tif
size_of_square	Int like 10, 25, 50 100 etc
speed_of_audio	Float like 0.25, 0.5, 0.75, 1 etc
amplitude	Bool 1 for max 0 for min
show_summary	Bool 1 to show and 0 to avoid.

App Working End...

Output

- Constant Hash
- *audio length = size_of_square x audio_length*

*Deciding Audio length is **Crucial** by Shrinking you Lose Data.*

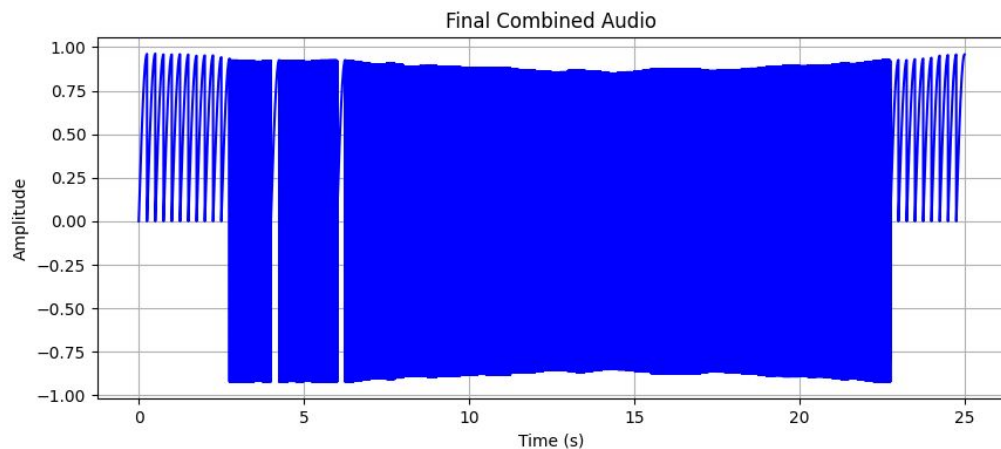
eg: for a 100 MB data the audio length should be 1000 sec.

Continues ...

Output Command :: *main.exe ./e3_ori.tif 100 0.25 1 1*



shape (6780,7071,5)



Output End...

App User

- Engineer
- Developer
- Analyst

For Performance and Precision you need C.

Questions and Answers Session

YouTube

[Sonification :: NASA Space App Challenge 2023 Islamabad](#)

GitHub

[MHM-Rajpoot/Sonification/Sonification1.0.0](#)

Thank You All



Jadu jayee ga pr jadu nhi jayee ga