ESGI195 Challenge: Accessibility Tools for Mathematical Exploration

This ESGI195 challenge is sponsored by

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In memory of Dr. Robin Williams.

Overview

This challenge brings together a mixed team of blind and sighted participants to explore how mathematical information can be communicated and experienced beyond visual representation. The goal is to collaboratively investigate alternative modalities - particularly sound - for representing data, structures, and relationships that are typically conveyed through plots, graphics and animations.

Participants are encouraged to draw on a range of tools and approaches, including (but not limited to) data sonification libraries and mobile device haptics. The emphasis is on shared exploration, thinking about accessibility, and practical experimentation rather than polished or complete solutions.

Challenge focus

The group explores how mathematical concepts can be translated into sound in a way that is interpretable, meaningful, engaging and usable for vision-impaired researchers and students.

Some directions to consider:

- How might a dataset or function be “heard” or “felt” in a way that preserves its key properties?
- What mappings between mathematical features and sensory outputs (e.g., pitch, rhythm, vibration intensity) are intuitive or learnable?
- How can tools be designed so that both blind and sighted users can collaborate effectively within a shared workflow?
- What are the limitations of current libraries or devices, and how might they be worked around or extended?

Participants are free to prototype small tools, modify existing packages, or create entirely new interaction concepts. The process should include discussion and feedback within the group, especially incorporating feedback from vision-impaired participants as primary users.

Outcome

The group should aim to produce a tangible demonstration or concept that illustrates one or more approaches to accessible mathematical representation. This does not need to be a complete and polished tool, but it should clearly communicate the idea and its potential use.

Outputs may include:

- A simple prototype (e.g., script, app, library or interactive demo)
- A documented concept with example mappings or use cases
- Reflections on what worked, what did not, and what could be explored further

The emphasis is on idea generation, experimentation, and shared understanding rather than technical completeness.