Crater Lake Sonification Documentation

Myriah Hodgson

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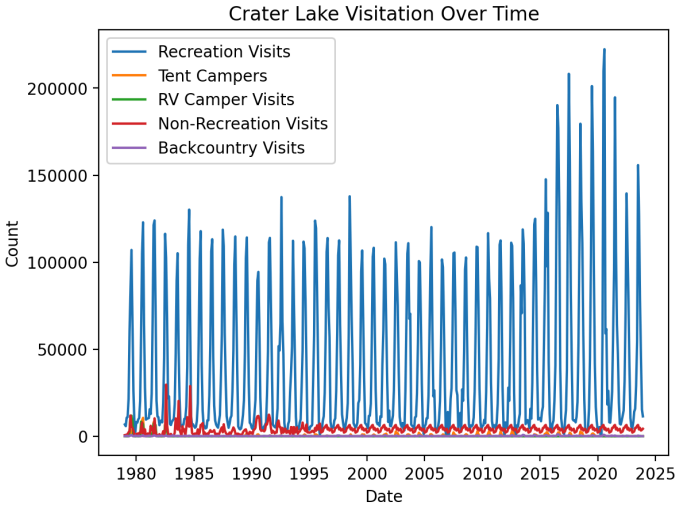
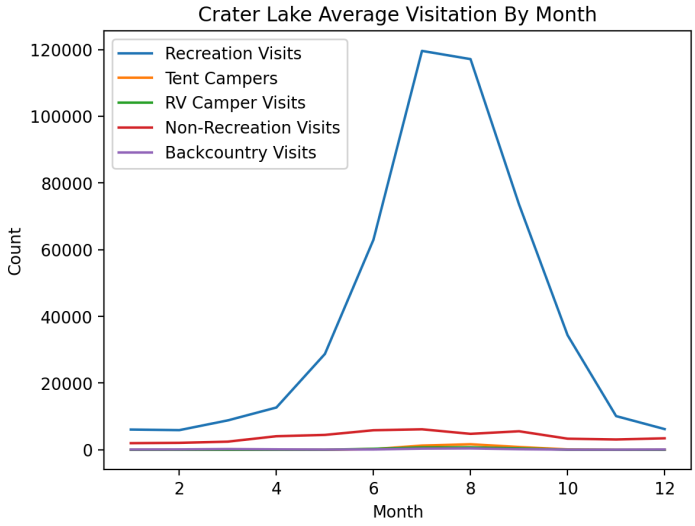
My livestreaming project is an example of music sonification. Using National Park Service data, I sonify the number of recreational visitors at Crater Lake National Park from 1980-2024. In this project, I first performed exploratory data analysis via Python. After identifying what visually looked interesting by making graphs of various features in the dataset, I then used Python's music21 package to convert my chosen data to midi. I next used the midi within Garageband to create the audio outcome for this project. I live streamed via Youtube using the OBS Studio software. I thought the addition of a picture of Crater Lake as a visual was also a nice touch.





Above are the visualizations I made using matplotlib in Python. You can see that the visitation to Crater Lake fluctuates across the timespan, specifically by having a peak during summer months and a lull during winter months each year. Based on the above visualizations, I chose to sonify the Recreation Visits, mapping pitch based on the visitor count. I also mapped velocity to the Non-Recreation visits to add more dynamics to the piece.

```python
# Scaling function for MIDI values
def scale_value(value, old_min, old_max, new_min, new_max):
    return ((value - old_min) / (old_max - old_min)) * (new_max - new_min) + new_min

# Get min/max for scaling
pitch_min, pitch_max = crater_lake['RecreationVisits'].min(), crater_lake['RecreationVisits'].max()
vel_min, vel_max = crater_lake['NonRecreationVisits'].min(), crater_lake['NonRecreationVisits'].max()

# Normalize columns
crater_lake['Pitch'] = crater_lake['RecreationVisits'].apply(lambda x: int(scale_value(x, pitch_min, pitch_max, 40, 100)))
crater_lake['Velocity'] = crater_lake['NonRecreationVisits'].apply(lambda x: int(scale_value(x, vel_min, vel_max, 20, 127)))
```

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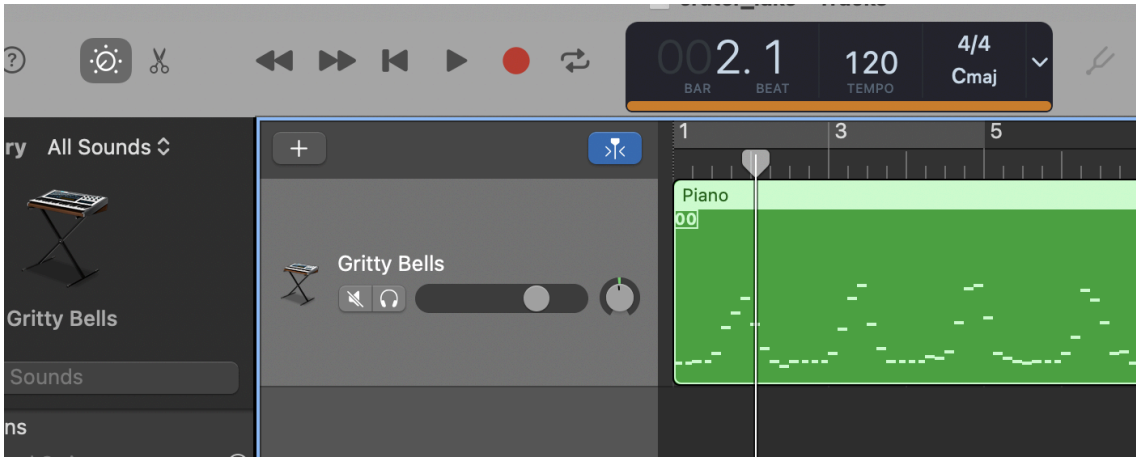
```python
# Create a MIDI Stream
midi_stream = stream.Stream()

# Assign an instrument (e.g., piano)
midi_instrument = mus.instrument.Piano()
midi_stream.append(midi_instrument)

for idx, row in crater_lake.iterrows():
    n = note.Note(row['Pitch'])  # Assign pitch
    n.quarterLength = 0.5  # Fixed duration (adjust if needed)
    n.volume.velocity = row['Velocity']  # Assign velocity
    midi_stream.append(n)

# Save as MIDI
midi_fp = "crater_lake.mid"
midi_stream.write('midi', fp=midi_fp)
print(f"MIDI file saved as {midi_fp}")
```

✓ 0.0s Python



Lastly, in Garageband I chose the 'Gritty Bells' synthesizer for my instrumentation. I liked the light, ringing, yet digital sound of the instrumentation. Keeping it so light connects the sonic outcome of the piece to its inspiration, the human relationship to Crater Lake National Park. My roommates and I have also been watching Severance recently, and I thought the clean, blue water visual paired with elevator-like music gives the same ominous vibe as aspects of the series, which I enjoyed.

In all, the project exemplifies networks in a few ways. The inspiration is an example of an analog network, in that NPS connects people with the outdoors as a central hub, and we can watch the amount of individuals coming to the park vary throughout each year (tracking each visitation like nodes of a web).

Additionally, the performance exemplifies digital networking by using data as a compositional source, sending data information via midi, and using my coding and workflow as a network through which information is being digitally transferred until the final sonic outcome.