Project Progress Report:
Using Google Sheets as a DAW / Piano Roll

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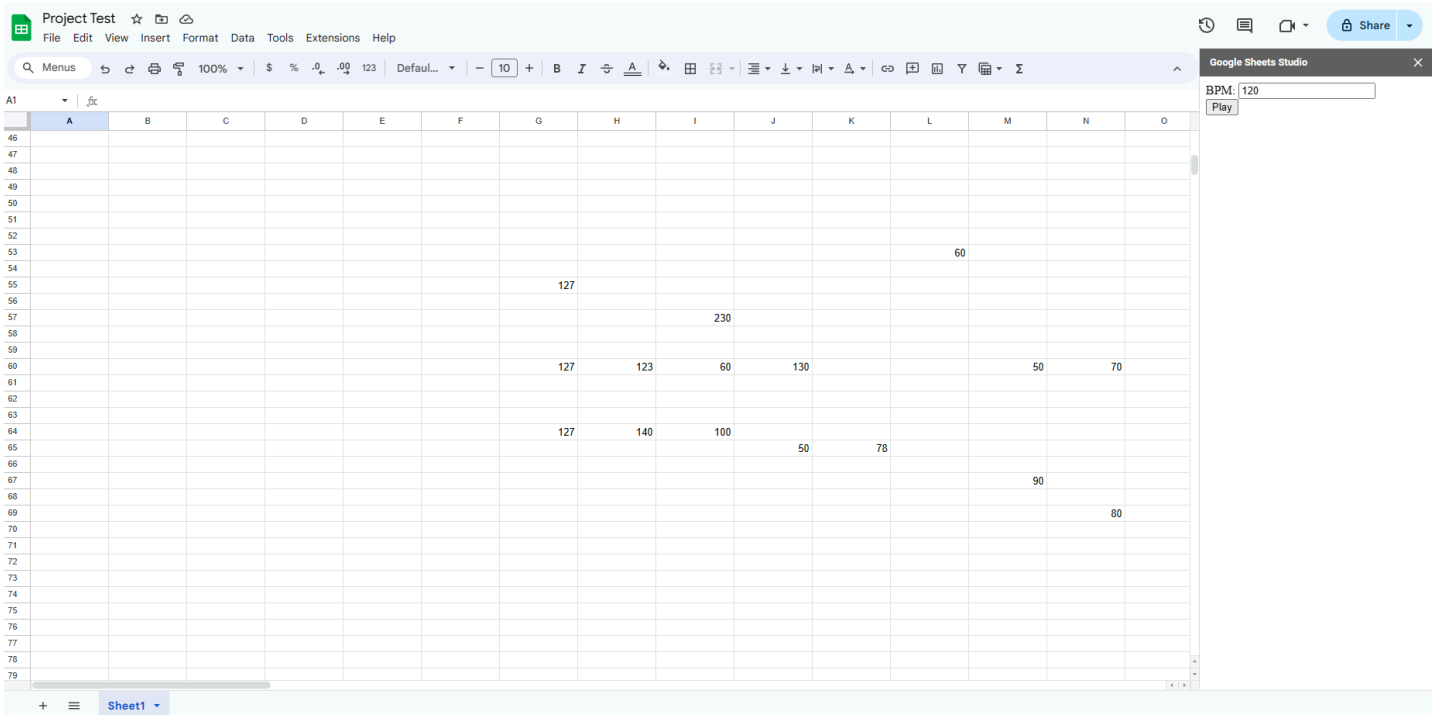
Project Description:
I am building a Piano Roll in Google Sheets using Google App Scripts and WebAudioAPI. From the data presented in the file, a sequence of notes and pitches will be played from the Add-on. Reading the rows as musical pitches — low-numbered as low notes, and high-numbered as high notes — and the columns as musical time — left-to-right, with each column as a specified note/beat duration — then the spreadsheet can act as a quantized piano roll.

Progress:
So far, I've accomplished the following:

- Creating a Google Sheets add-on with a sidebar and integrating WebAudioAPI.
- Horizontal Parse: Being able to read velocity values in multiple columns and play notes in sequence.
- Vertical Parse: Being able to read velocity values from multiple rows in the same column and play chords.
- Implementing a BPM input on the sidebar. I defined a "beat" to be two columns, so that, in 4/4 time, each column is an eighth note.
- Being able to play notes and audio using oscillators.

The image below is what the UI looks like, not showing the colored columns representing time progression.



Current issues:

- I tried using Google Scripts to change the column color to signify that the musical time is progressing through each interval and playing the notes in that column. However, there is a significant and noticeable delay between when the notes in the column are played as audio and when the column is colored. I am not sure if there is a fix for this.
- I need to look into how to share a test for the project. Currently it is only available for my Google account.

On testing: without publishing the add-on to the Google extensions store/library, currently the only way to test the add-on is using my account and test files, or to create an add-on on a personal account and recreating the test files. In the CAMP folder I've included a zip of all the code files used in the add-on, so adding these files to your Google App Scripts with the Google Sheets service and creating a test deployment will allow you to test.

1. Go to https://script.google.com/home/ and create a "New project"
2. In "Project Settings", uncheck the option "Enable Chrome V8 runtime"
3. Download the code files from the CAMP folder or from the Github repo
4. In "Editor" add all the code files
5. To test, navigate "Deploy" > "Test Deployments" and click on "Add test". For the "Config" setting, choose "Installed and Enabled". For the "Test Document", create a new or choose an existing Google Sheets file. Click "Save Test". Select the radio button for that test deployment and click "Execute".
6. After the test file opens and loads fully, navigate "Extensions" > "DAW" > "Show sidebar". Add velocity values to the spreadsheet as detailed in the project description and click "Play" to hear the audio.

Future plans:

- Implement interpolation so that there is no clipping for every note.
- Fix audio amplitudes to account for multiple notes playing at the same time with varying velocities. When the sum of the amplitudes exceeds 1, we hear a rough buzzing.
- Use colors to highlight where notes exist and shades to represent the relative velocity values (dark is low velocity, bright is high velocity).