



Estimating the Tempo of Audio Files

.WAV and .MID Formats

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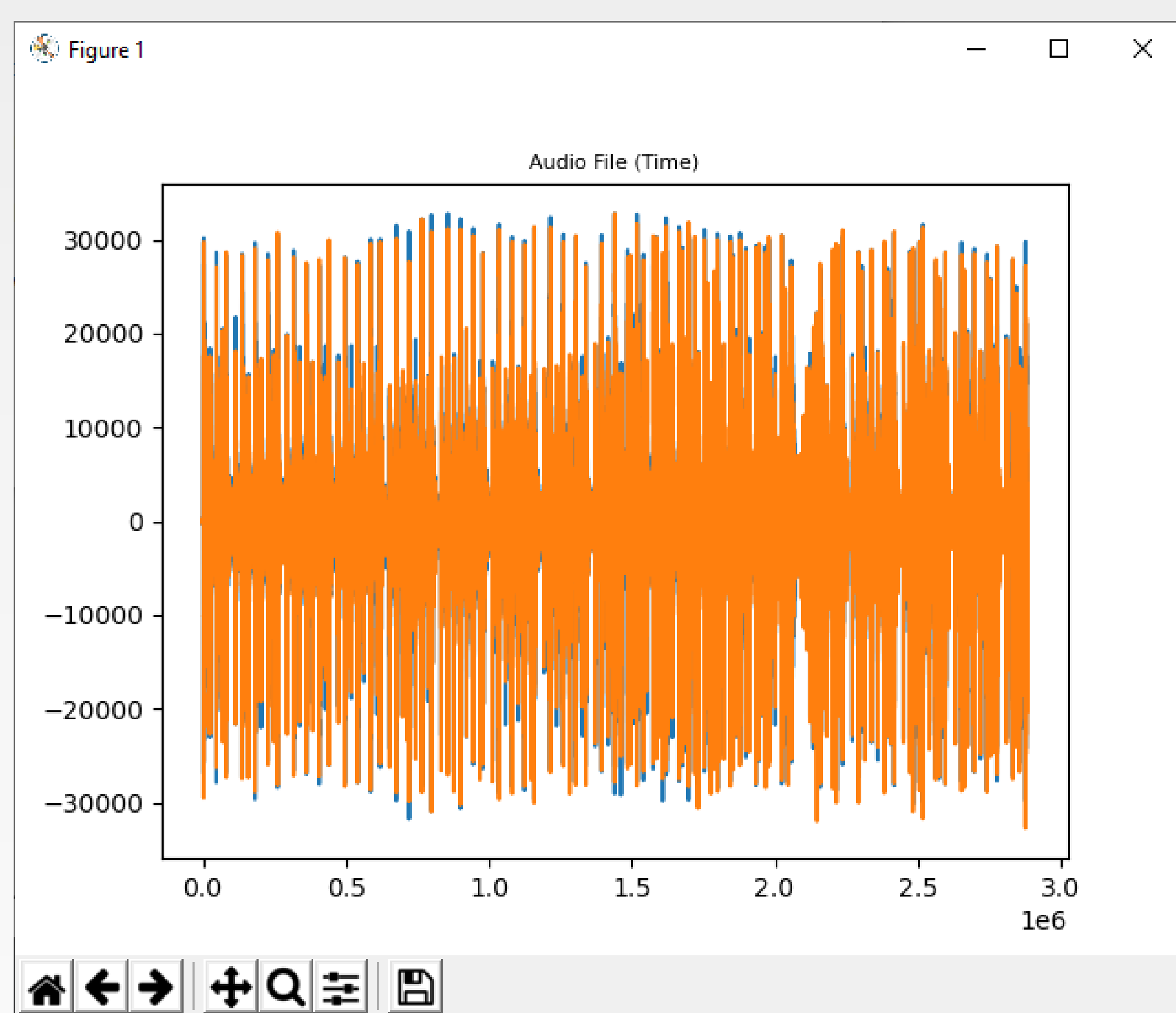
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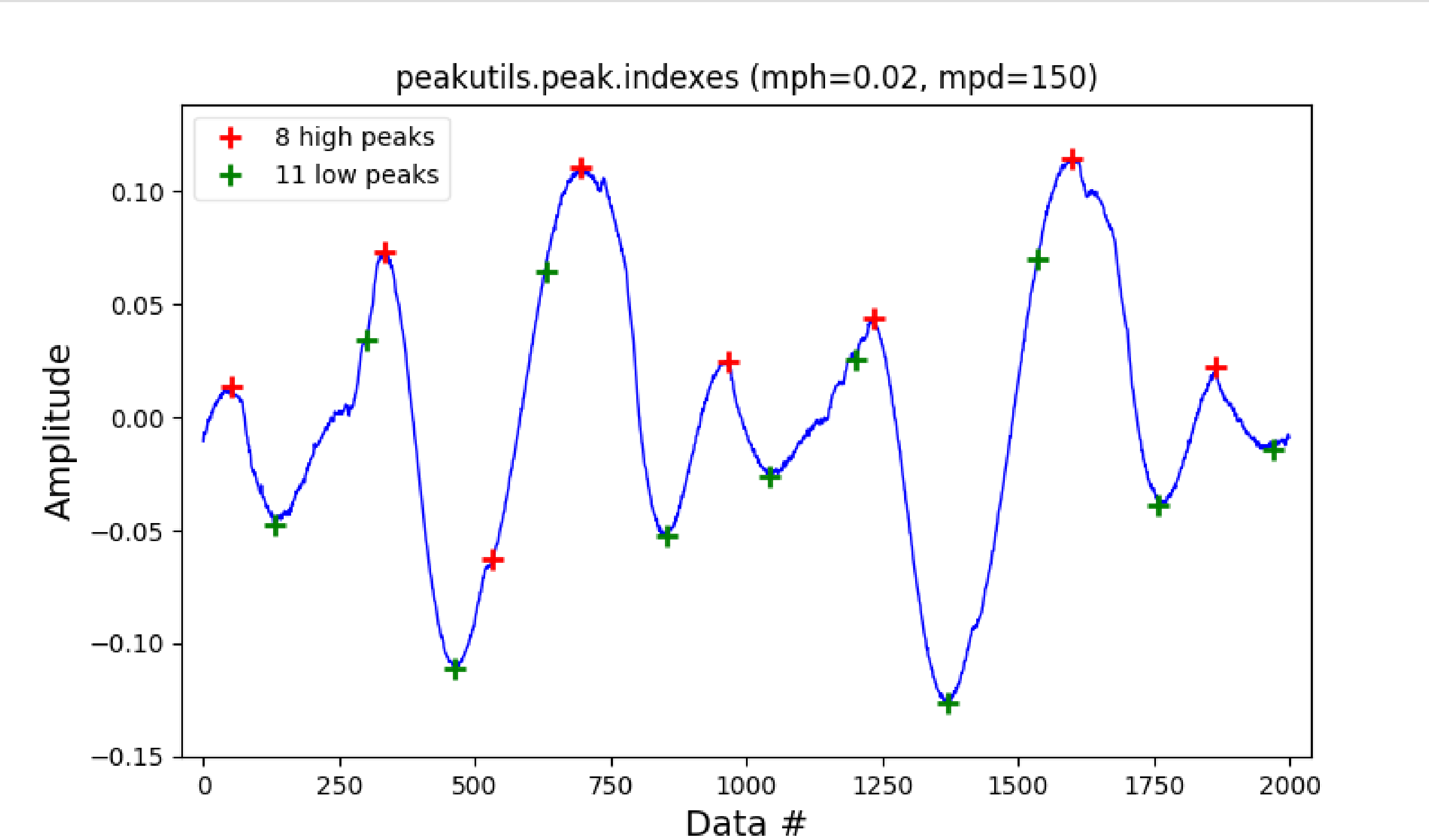
Section Title: For this project, I created a simple and easy to use software that estimates the tempo of WAV and MIDI files.

Body text

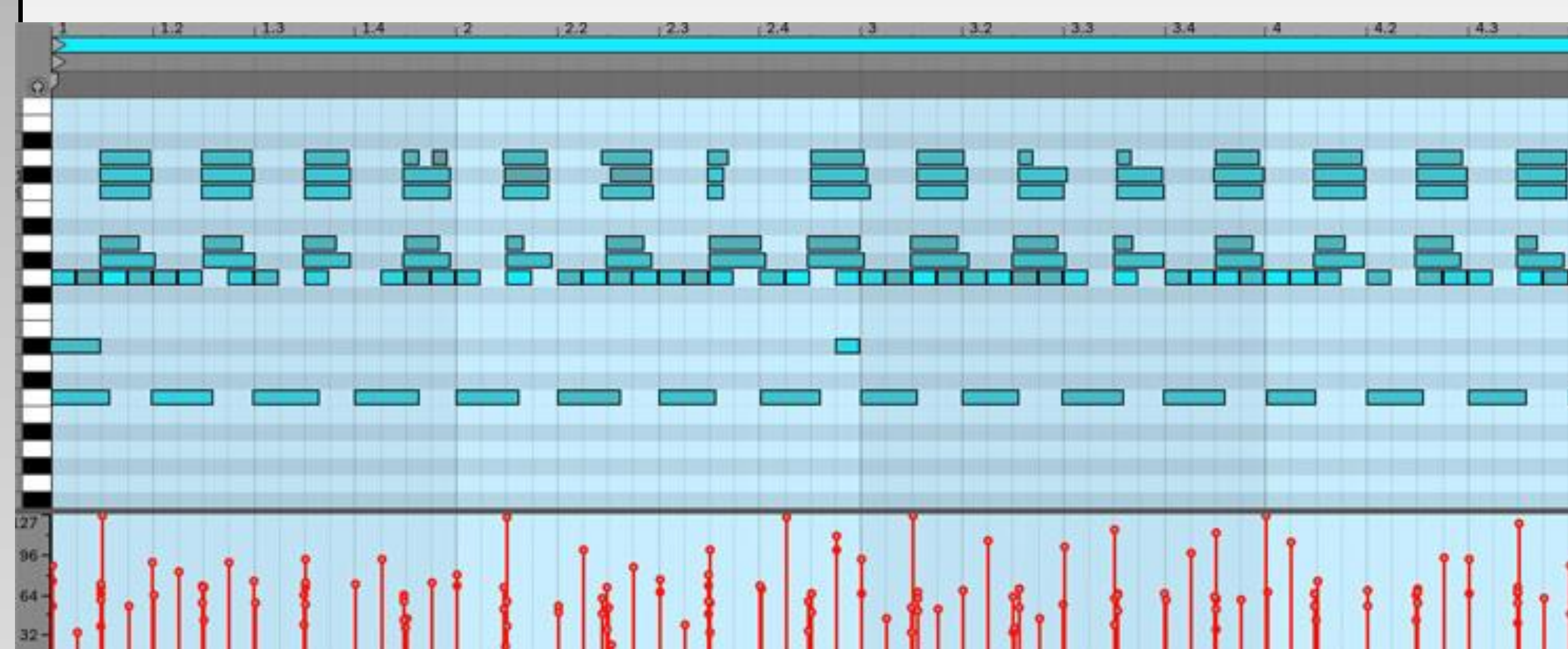
I chose this subject because the science behind is challenging, interesting, and incomplete. Another reason is because most tempo detecting software cost money, so I wanted to create my own.



I used Python 3 to help me create my project. I thought it was very important to provide visualizations to the user so they could see and understand the work that was being done. I used matplotlib for this.

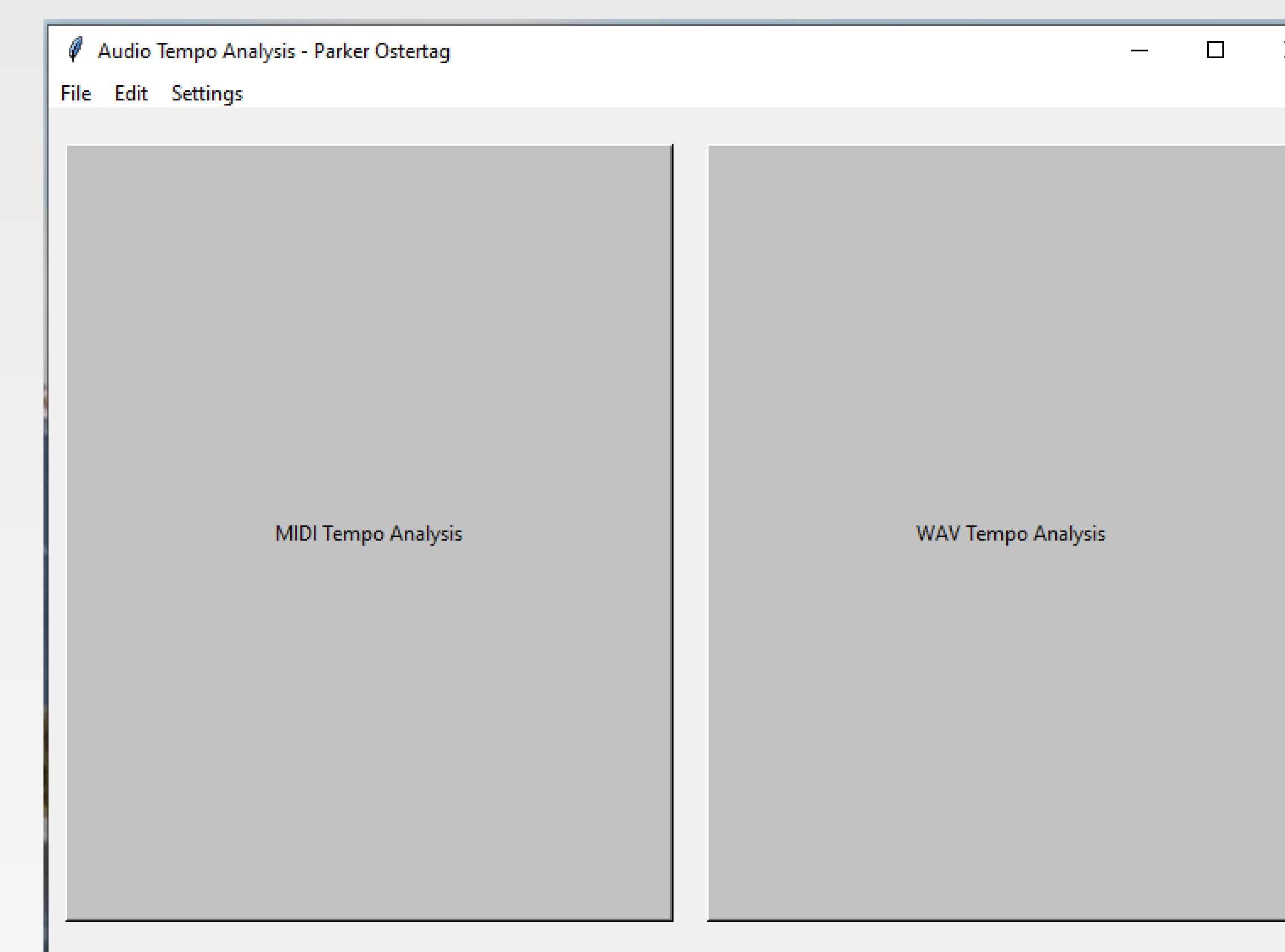


The algorithm used to find peaks would analyze the spectrum. The sum of the peaks and timestamps are put into a list for parsing



Most MIDI files have metadata that include the tempo of the song. I extract this information. If my program does not detect that metadata, it will convert the midi file to WAV and detect the tempo through the audio spectrum.

The science behind tempo analysis of audio files is incomplete. Some experts say that it is impossible for perfect tempo detection based on audio spectrums. There are a lot of variables that can prevent accurate results. My programs estimations were, on average, 9 BPM off.



My user interface design is simple. There are file browsers and settings for database preferences and editing. A user can upload their results to a database.

filename	tempo	peaksDetected	songDuration
C:/Users/pkhoc/Desktop/Senior Project/149.wav	146.	385	0:02:38.658503
C:/Users/pkhoc/Desktop/Senior Project/121.wav	142.	290	0:02:02.856100
C:/Users/pkhoc/Desktop/Senior Project/129.wav	132.	132	0:01:00.026667
C:/Users/pkhoc/Desktop/Senior Project/174.wav	170.	168	0:00:59.993288
C:/Users/pkhoc/Desktop/Senior Project/227.wav	208.	205	0:00:59.993288
C:/Users/pkhoc/Desktop/Senior Project/ff.wav	145.	568	0:03:55.194921
C:/Users/pkhoc/Desktop/Senior Project/ff_full...	137.	573	0:04:10.801633