

Question 1.1a

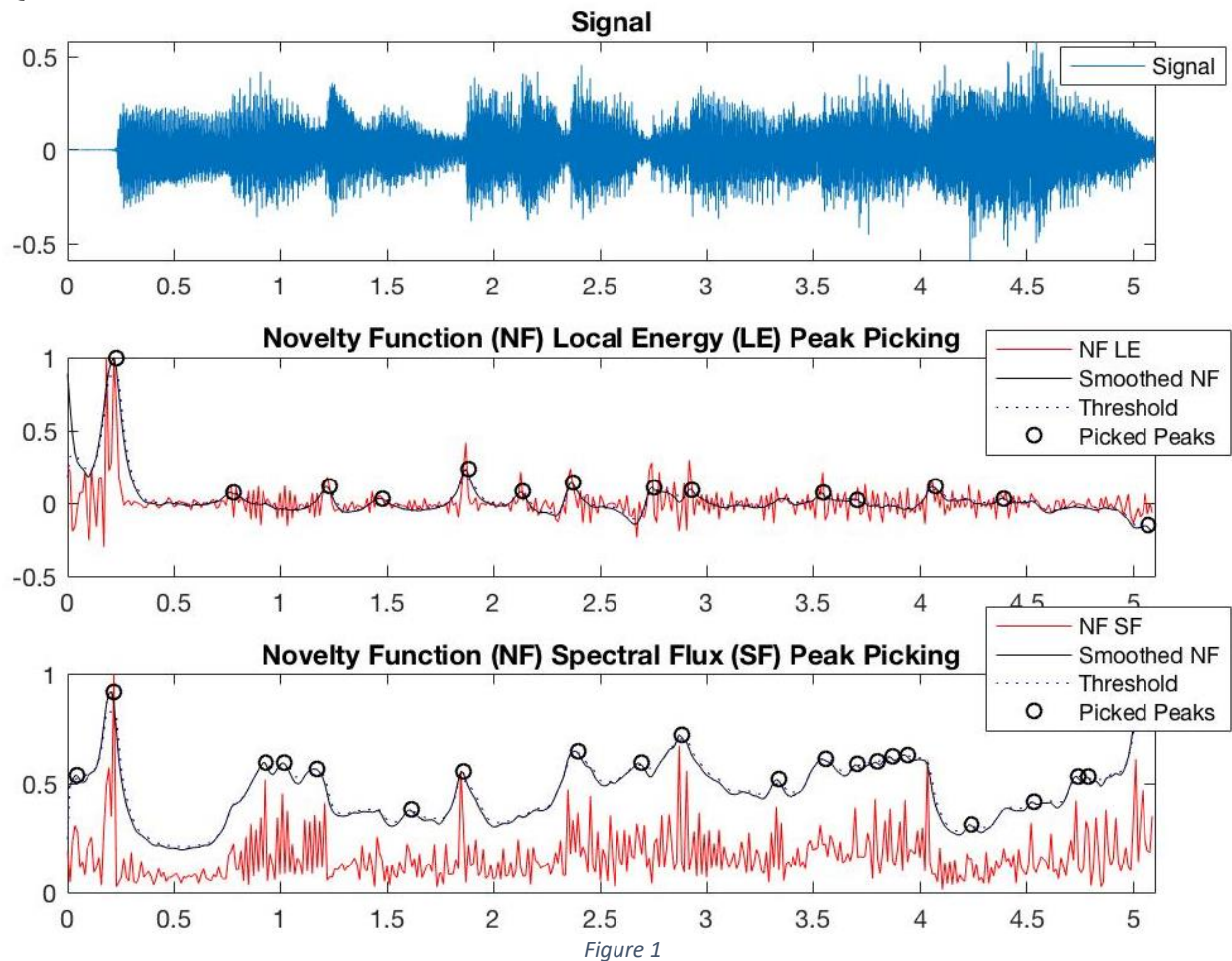


Figure 1

Question 1.1b

Commenting on my sonic perception of the novelty/onset aspects of '[PianoDebussy.wav](#)', this sound starts with a very strong (high energy) attack of a piano chord. The chords and notes throughout the approximately 5 second signal are resonate. This resonance drowns out potential onsets, and so complicates both human and machine novelty detection. Also complicating the novelty detection are the quickly played (closely positioned in time) and accented notes throughout the signal. The signal is very tonal and (less so) percussive.

Question 1.1c

The plots of the Log Energy novelty function and Spectral Flux novelty function (and associated subplots) for '[PianoDebussy.wav](#)' are seen in figure 1. Both of these novelty function plots take on the following parameters:

```
filepath = 'PianoDebussy.wav'; win_size = 1024; hop_size = 512; w_c = 4;
medfilt_len = 8; offset = .01;
```

It is clear that both of the functions are successful in detecting audibly and visually perceived onsets. The difference in the number of onsets that each function detects occur for one of two reasons: either the local energy function is under-detecting onsets or the spectral flux function is over-detecting onsets. The answer is likely both, since each function is better for certain scenarios. In this scenario, the local energy function, which is better for detecting strong

percussive onsets, misses the subtle accented notes that the spectral flux detects, since it is capable of reading small changes in the power of each frequency bin.

Question 1.2a

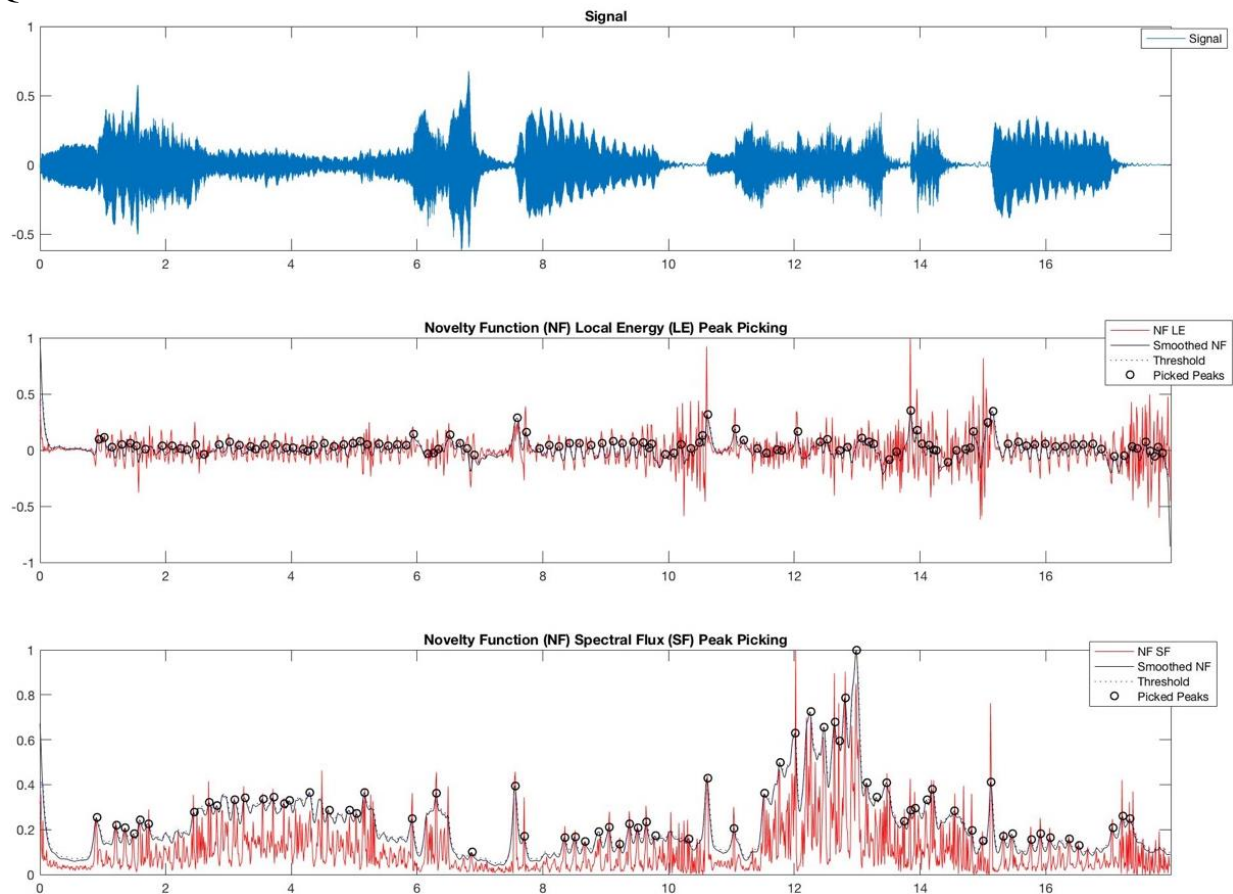


Figure 2

Question 1.2b

Commenting on my sonic perception of the novelty/onset aspects of `'T08-violin.wav'`, this sound starts with a very subtle attack of a violin note, which fades in. The notes throughout the approximately 18 second signal contain a lot of vibrato, which I assume will be detected as many onsets by the log energy function. The strong onsets are audibly and visually clear. However there are many note changes and playing techniques that are not so objectively defined as onsets, like vibrato, hammer on/off note changes, and dynamic changes.

Question 1.2c

The plots of the Log Energy novelty function and Spectral Flux novelty function (and associated subplots) for `'T08-violin.wav'` are seen in figure 2. Both of these novelty function plots take on the following parameters:

```
filepath = 'T08-violin.wav'; win_size = 1024; hop_size = 512; w_c = 4;
medfilt_len = 8; offset = .01;
```

It appears as if the log energy function is over detecting peaks, due to the heavy use of vibrato in the playing, which may deceive the function as very quick fluctuations in energy. However it is clear from both of the plots that the more objective onsets (note changes and sudden note attacks) are detected as novelties. The spectral flux plot perceives less onsets (picking fewer peaks), although it still appears to over-detect. The very insensitive offset parameter can be responsible for this, as the novelty functions include many peaks that exceed the threshold.