I am currently researching how to find the BPM of a song below are some formula I was recommended.

1 On-Set Detection

1.1 Sound energy algorithm

From link below
The algorithm divides the data into blocks of samples and compares the energy of a block with the energy of a preceding window of blocks. The energy of a block is used to detect a beat. If the energy is above a certain threshold then the block is considered to contain a beat. The threshold is defined starting from the average energy of the window of blocks preceding the one we are analyzing. If a block j is made of 1024 samples and the song is stereo, its energy can be computed as:

$$E_j = \sum_{i=0}^{1023} left[i]^2 + right[i]^2$$

This technique was deemed imprecise by the article.

2 Terms

If any are left blank go look em up!

Sampling Frequency - the number of samples per second in a Sound

Discrete wavelet transform -

Low-pass - Low-pass filters pass through frequencies below their cutoff frequencies, and progressively attenuates frequencies above the cutoff frequency. Low-pass filters are used in audio crossovers to remove high-frequency content from signals being sent to a low-frequency subwoofer system.

High-pass - A high-pass filter does the opposite, passing high frequencies above the cutoff frequency, and progressively attenuating frequencies below the cutoff frequency. A high-pass filter can be used in an audio crossover to remove low-frequency content from a signal being sent to a tweeter.

Bandpass - A bandpass filter passes frequencies between its two cutoff frequencies, while attenuating those outside the range. A band-reject filter attenuates frequencies between its two cutoff frequencies, while passing those outside the 'reject' range.

All-pass - An all-pass filter passes all frequencies, but affects the phase of any given sinusoidal component according to its frequency.

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3 Links to research

http://mziccard.me/2015/05/28/beats-detection-algorithms-1/
http://archive.gamedev.net/archive/reference/programming/features/beatdetection/index.html
http://shepazu.github.io/Audio-EQ-Cookbook/audio-eq-cookbook.html