In this article, a new feature extraction method is proposed for gear fault diagnosis by combining the empirical wavelet transform, Hilbert transform, and cosine similarity metric. In the first place, a number of empirical mode components acquisitions are done, using empirical wavelet transform. Since different empirical modes have different sensitivities to fault, not all of them are needed for further analysis. Therefore, the most sensitive empirical modes are selected using the cosine similarity metric method. Hilbert transform was then used to obtain the envelope for amplitude modulation. Finally, spectral analysis using fast Fourier transform is applied on the obtained envelope. Gear test rig with gears under different fault states has revealed an effective outcome and a solid stability of this new approach. The obtained results show that our approach is efficiently able to detect and expose the gear faults signatures, that is, it highlights their frequencies and the corresponding harmonics with respect to the rotary frequency. Furthermore, this proposed method demonstrates more satisfactory and advantageous performances compared to those of fast kurtogram, or the autogram