EARLY DETECTION OF OVARIAN CANCER USING GABOR WAVELET PHASE QUANTIZATION AND BINARY CODING

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Abstract:

ix ABSTRACT Stuart Morton EARLY DETECTION OF OVARIAN CANCER USING GABOR WAVELET PHASE QUANTIZATION AND BINARY CODING Ovarian cancer is the 5th most common cancer in women, but it is the most difficult to detect in its early stages. Early detection and treatment of ovarian cancer has been shown to increase the five year survival rate of a woman from 12% if caught in stage four of the disease up to 92% if caught in stage one of the disease. Using signal processing, pattern classification and a learning algorithm, it is possible to identify patterns in high dimensionality mass spectrometry data that distinguishes between cancer and non-cancer ovarian samples. For our research, proteomic spectra were generated using SELDI-TOF mass spectrum data, which was composed of 162 ovarian cancer and 91 non-ovarian cancer samples. We introduce a Gabor filter on the mass spectrometry data and design a binary coding scheme for phase quantization encoding that is used for the pattern classification. This pattern will expose crucial features in the data that can be used to correctly classify unmasked samples for the presence or absence of ovarian cancer. Our proposed algorithm was able to successfully discriminate ovarian cancer and non-ovarian samples that yielded results with sensitivities, specificities and accuracies in the 90% to 100% range.

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