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Using artificial neural networks and image processing techniques for automation of cancer screening

Among cancers, Cervical Cancer is rated the second most cause of death. The most successful method for diagnosing is the "Pap Smear" test. This paper addresses the problems associated with manual screening of the "Pap Smear" specimens. The objective of the project was to develop an automated system for inspecting specimens, using techniques of artificial neural networks and image processing.

The system takes in real world "Pap Smear" specimen images as inputs and the outputs are results of diagnosis. It consists of three layers architecture, having an image capture layer, a pre processor and a diagnosis layer. The technologies used are twofold, image-processing ad Artificial Neural Networks. The system consists of three artificial neural networks; one for image processing and the other two for making a diagnosis. The network for diagnosis has two different neural networks that process two different types of parameters (namely the nuclei area and the nuclei density) for diagnosing cancer. All networks were multi-layer feed forward type, trained using the back propagation-training algorithm subjected to the maximum error of 1*10-10. The results from this system were compared with the results from manual inspection and the accuracy was found to be 73%. This indicates that the automated process of specimen inspection is a promising one.