Quantitative Analysis of Macro-Cellular Biomarkers in Early Stage Ductal Carcinoma in situ (DCIS) Immunohistochemical Cytopathology Images Using Machine Learning

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The higher incidence of DCIS cases in underdeveloped nations and an increased need for cytopathological tests have placed an undue learning burden on the medical enterprise to process millions of images in an efficient and cost-effective manner. The purpose of this experiment is to write a self-learning algorithm with a preset confidence that is biologically aware of DCIS micropapillary/papillary disease in early stages. Can we measure carcinogenic tumor activity in early stage DCIS using a machine learning technique with an 80% success rate? Procedures I learned that cancer biology is intrinsically linked to histopathological outcomes. The extent of my work involved collecting images of papillary/micropapillary DCIS. The experiment analyzes 30 JPEG image files using ImageJ. (Training data set size = 500 image files) The values for observed coverage are an average of 9 iterations per image. Results/Conclusions I was able to measure carcinomic activity in the ducts with an 80.9% level of accuracy from my algorithm. This measurement helps the oncologists focus on relevant DCIS images. My algorithm was able to learn how to identify ducts and measure the amount of carcinomic activity in them, by using an approach I invented and called Radial Vector Metrics (RVM) based machine learning. Summary My results met my engineering goal, because I was able to achieve 80.9% rate of accuracy. This is a valuable insight for future scientists because this research is proceeding in the right direction using an innovative approach (RVM). My results are specific to a particular sub-classification of DCIS- Micropapillary and Papillary carcinomas. I learned that I could consistently and reliably obtain results that showed the measure of carcinomic activity in low-grade DCIS.

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