Breast Cancer Doctor Analysis

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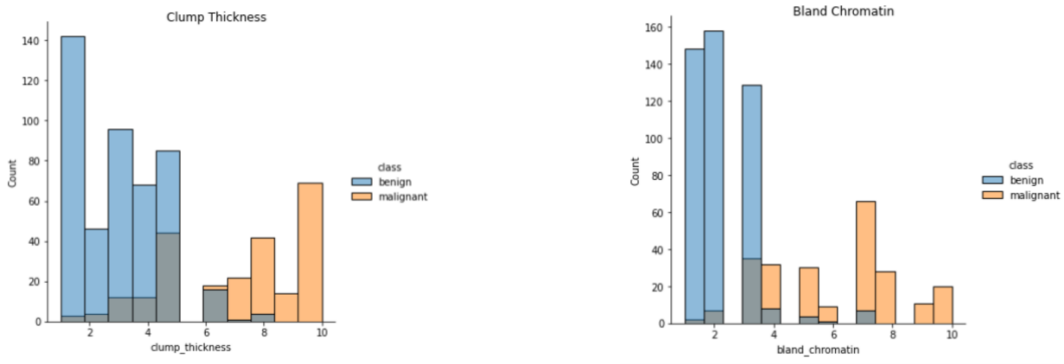
PSY 341K Psychology Data Science Foundations II

Introduction

This paper will report regarding the doctors in the hospital who work with breast cancer patient: Dr. Doe, Dr. Smith, Dr. Lee, and Dr. Wong with respect to measuring clump thickness, bland chromatin, and diagnosis of tumor type. Clump thickness is indicating grouping of cancer cells in multilayer, which scale from 1 – 10. The clump thickness scale is a 1-10 rating system used in medical settings, with 1-2 indicating very thin tissue, 3-4 indicating average thickness, 5-6 indicating moderately thick tissue, 7-8 indicating thick tissue, and 9-10 indicating very thick tissue, and the scale serves as a general guideline for interpreting the thickness of breast tissue. Bland chromatin describes a uniform texture of the nucleus seen in benign cell, which also scale from 1 – 10. To interpret the Bland Chromatin Scale, a medical professional will analyze the nuclei of cells in a tissue sample under a microscope, and the scale provides a general guideline for interpreting the scale's 1-10 range, where a rating of 1-2 indicates a normal and well-differentiated nucleus, 3-4 indicates a mildly abnormal and somewhat differentiated nucleus, 5-6 indicates a moderately abnormal and moderately differentiated nucleus, 7-8 indicates a markedly abnormal and poorly differentiated nucleus, and 9-10 indicates a severely abnormal and undifferentiated nucleus. Lastly, the two types of tumors that will be analysis in this report are benign and malignant. Benign tumors are not cancerous and will not spread to other tissues or organs. However, malignant tumors are cancerous and will spread to other tissues or organs.

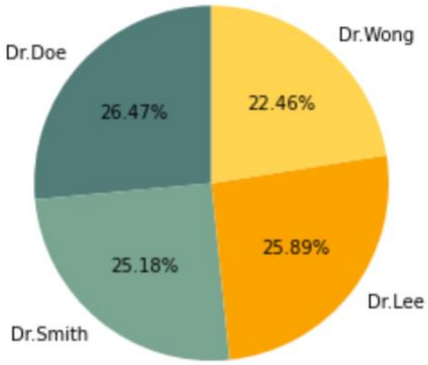
Analysis

Fig 1. Comparison Between Clump Thickness and Bland Chromatin in Each Class



There are 699 patients in total for this data. However, there are 698 patients with clump thickness and 695 patients with bland chromatin. The mean for clump thickness is 2.96 for benign class (std = 1.67) and 7.20 for malignant class (std = 2.43). The mean for bland chromatin is 2.11 for benign class (std = 1.08) and 5.99 for malignant class (std = 2.27). Also, benign class never reach 10 on both clump thickness and bland chromatin. As being illustrated in Fig 1, benign tumors had overall lower rate than malignant tumors in both clump thickness and bland chromatin.

Fig 2. Patients Ration for Each Doctor



As illustrated in Fig 2, each doctor had very similar ratio of patients in the range of 22% - 26% of total patients (699 patients). Dr. Doe had 185 patients, which considered as 26.47% of total patients. Dr. Smith had 176 patients, which considered as 25.18% of total patients. Dr. Lee had 181 patients, which considered as 25.89% of total patients. And, Dr. Wong had 158 patients, which considered as 22.46% of total patients.

Dr. Doe

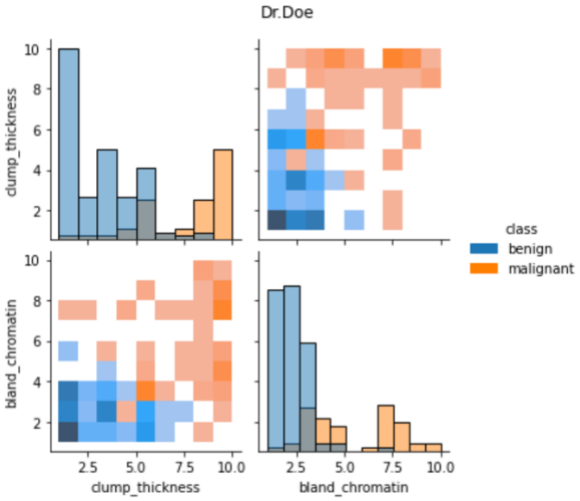
In patients with clump thickness, Dr. Doe had 127 patients with benign tumors and 58 patients with malignant tumors. The mean of patients with benign tumors is 2.64 (std = 1.74)

with the min of 1 and max of 8 in scale of 10. Meanwhile, the mean of patients with malignant tumors is 7.58 (std = 2.46) with the min of 1 and max of 10 in scale of 10.

In patients with bland chromatin, Dr. Due had 126 patients with benign tumors and 58 patients with malignant tumors. The mean of patients with benign tumors is 2 (std = 1.00) with the min of 1 and max of 7. Meanwhile, the mean of patients with malignant tumors is 5.46 (std = 2.26) with the min of 1 and max of 10 in scale of 10.

As illustrated in Fig 3., Dr. Doe's patients mostly had benign tumors when comparing to malignant tumors. However, Dr. Doe had a very similar ratio between the number of patients in both clump thickness and bland chromatin. If number of patients correlate with skills, Dr. Doe could have more skillful in treating patients with benign tumors than malignant tumors.

Fig 3. Overall Data of Dr. Doe



Dr. Smith

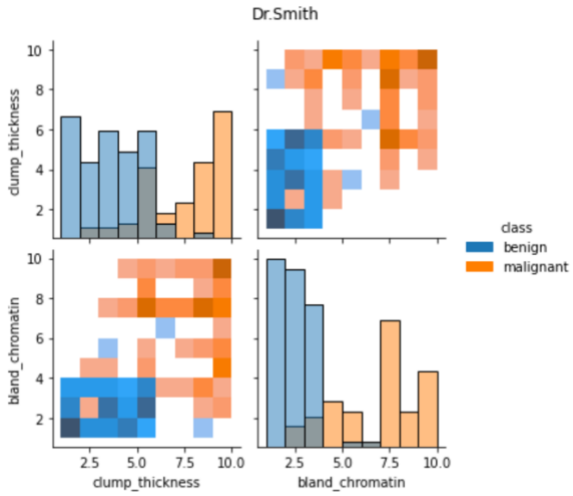
In patients with clump thickness, Dr. Smith had 102 patients with benign tumors and 73 patients with malignant tumors. The mean of patients with benign tumors is 3.10 (std = 1.61) with the min of 1 and max of 8 in scale of 10. Meanwhile, the mean of patients with malignant tumors is 7.53 (std = 2.23) with the min of 2 and max of 10 in scale of 10.

In patients with bland chromatin, Dr. Smith had 102 patients with benign tumors and 74 patients with malignant tumors. The mean of patients with benign tumors is 1.98 (std = 0.94) with the min of 1 and max of 6. Meanwhile, the mean of patients with malignant tumors is 6.46 (std = 2.33) with the min of 2 and max of 10 in scale of 10.

As illustrated in Fig 4., Dr. Smith had a very similar number of patients in all classification (benign vs malignant; clump thickness vs bland chromatin). Interestingly, Dr.

Smith's patients tend to have slightly higher rating of tumors in both clump thickness and bland chromatin. Nevertheless, Dr. Smith appears to have well rounded skills because Dr. Smith, at least in clump thickness, had different variable of patients with different type and rate of tumors. Although other doctors may not have a high rating of patients with malignant tumors, Dr. Smith seems to have similar number of high rating patients with malignant tumors in both clump thickness and bland chromatin. Thus, Dr. Smith may have well rounded skills in treating patients with both benign and malignant tumors.

Fig 4. Overall Data of Dr. Smith



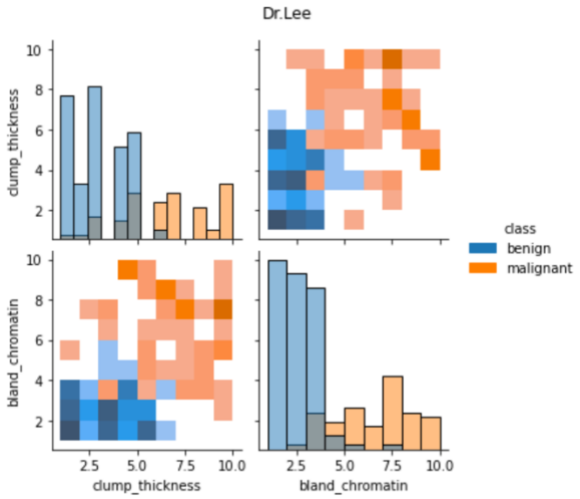
Dr. Lee

In patients with clump thickness, Dr. Lee had 121 patients with benign tumors and 60 patients with malignant tumors. The mean of patients with benign tumors is 2.98 (std = 1.49) with the min of 1 and max of 6 in scale of 10. Meanwhile, the mean of patients with malignant tumors is 6.60 (std = 2.39) with the min of 1 and max of 10 in scale of 10.

In patients with bland chromatin, Dr. Lee had 119 patients with benign tumors and 60 patients with malignant tumors. The mean of patients with benign tumors is 2.07 (std = 1.01) with the min of 1 and max of 7. Meanwhile, the mean of patients with malignant tumors is 6.15 (std = 2.12) with the min of 2 and max of 10 in scale of 10.

As illustrated in Fig 5., similar to Dr. Doe, the majority of Dr. Lee's patients had benign tumors. Also, Dr. Lee had a similar ratio between patients with clump thickness and bland chromatin. Thus, Dr. Lee could be comfortable or more skillful in treating patients with benign tumors.

Fig 5. Overall Data of Dr. Lee



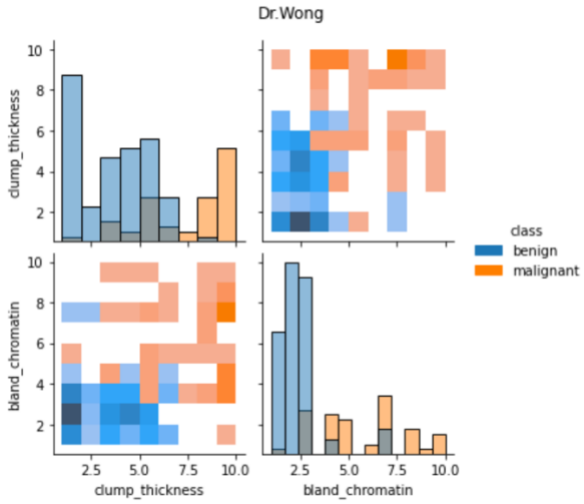
Dr. Wong

In patients with clump thickness, Dr. Wong had 108 patients with benign tumors and 49 patients with malignant tumors. The mean of patients with benign tumors is 3.17 (std = 1.80) with the min of 1 and max of 8 in scale of 10. Meanwhile, the mean of patients with malignant tumors is 7.27 (std = 2.56) with the min of 1 and max of 10 in scale of 10.

In patients with bland chromatin, Dr. Wong had 108 patients with benign tumors and 49 patients with malignant tumors. The mean of patients with benign tumors is 2.29 (std = 1.30) with the min of 1 and max of 7. Meanwhile, the mean of patients with malignant tumors is 5.71 (std = 2.26) with the min of 2 and max of 10 in scale of 10.

As illustrated in Fig 6., in clump thickness, Dr. Wong had a very wide range patients in clump thickness (majority is still patients with benign tumors). However, when we look at the bland chromatin, Dr. Wong treated mostly treated patients with low rating benign tumors when comparing to malignant tumors. Thus, Dr. Wong could be more comfortable and skillful in treating patients with clump thickness than bland chromatin.

Fig 6. Overall Data of Dr. Wong



Conclusion

All doctors in this hospital had similar number of patients and pattern of patients. All doctors had more patients with benign tumors than malignant tumors. Thus, the analysis may show that most doctors were more proficiency in treating patients with benign tumors. However, Dr. Smith appears to have similar number of patients who had benign or malignant tumors, which influence the analysis to suggest that Dr. Smith could be more comfortable at treating patients with both type of tumors, especially, patients with clump thickness. Lastly, Fig 7. illustrated the comparison between each doctor.

Fig 7. Overall Data of Each Doctor