Greenspace Team 3 - Therapeutic Alliance
Week 5 Team Report

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- Team progress compared to the project plan and milestones

In our planned timeline, between May 26th to June 1st, we aimed to complete the following tasks: Model Setup and Initialization, Model Fine-Tuning I, Mid-point Presentation, and Model Comparison. Our progress aligns well with the expected timeline. In fact, we are slightly ahead of schedule. Last week, we successfully completed a significant portion of the model setup and tuning.
However, the results from last week were not ideal, prompting us to try new parameters based on the existing models this week. We introduced two complex and statistically significant metrics:

1. The ratio of patients whose PHQ-9 assessment score showed successful treatment (severity level reduced) to the total number of patients under each therapist.
2. The ratio of patients whose normalized PHQ-9 assessment scores improved to the total number of patients of each therapist.

We observed how changes in these ratios correlated with the therapeutic alliance score. Additionally, we experimented with unsupervised learning models (k-means clustering, hierarchical clustering, GMM clustering) to explore new findings.

Results:

Although logically these two ratios were expected to play a significant role in observing changes in the therapeutic alliance score, neither ratio showed substantial value in the correlation matrix. Specifically, the first ratio demonstrated a correlation of 0.06, while the second showed 0.13.
Our trials with unsupervised learning models also yielded suboptimal results. The Silhouette Scores for k-means, hierarchical clustering, and GMM clustering were 0.17, 0.09, and 0.042, respectively, which are poor indicators of the presence of unrevealed relationships.

- The individual contributions on what they have done in previous week

Group Member	Contribution	Challenges
Kohsin	1. Performed a t-test to determine if there are any different features between the high therapeutic alliance score group and the low therapeutic alliance score group. 2. Using SQL, extract all therapists, link them to their assigned patients and their PHQ-9 assessment responses, remove responses with a score of NA, and organize the data for other team members to analyze. 3. Using SQL, extract all therapists, link them to their assigned patients and their therapeutic alliance related assessments, remove responses with a score of NA, and organize the data for other team members to analyze. 4. Conducted Principal Component Analysis (PCA) and K-means clustering to identify patterns that supervised machine learning methods might not be able to detect.	Some patients may have link to several therapists, making the analysis more complicated.
Zerui	1. For all patients who did PHQ-9 assessment,	If the first assessment score is problematic, like 0 or 100,

	extracted their first and last score and calculated the improved score. 2. For each therapist, calculated the average improved score by his/her patients, and the percentage of patients who have a(n) improved/no change/worsened score. 3. Calculated and visualized the correlation between therapist TA score and average improved score/improved percentage.	the patient could be categorized into the wrong group (improved/worsened).
Zheng	1. Calculated the number of patients successfully treated by each therapist (final level improved compared to the initial level) in the largest clinic. 2. Determined the ratio of successfully treated patients to the total number of patients for each therapist across all PHQ9 assessments. 3. Explored the relationship between the above-calculated percentages and their Therapeutic Alliance (TA) scores, and analyzed the correlation.	The new added features are still not able to help predict the TA score.
Bingshen	Utilized unsupervised learning models such as k-means clustering, hierarchical clustering, and Gaussian Mixture Model (GMM) clustering to uncover previously unrecognized patterns in our data. These models were employed to	The Silhouette Scores for k-means, hierarchical clustering, and GMM are pretty low, not showing useful information

	identify natural groupings within the dataset that might not be immediately apparent through traditional analysis methods. By leveraging these clustering techniques, we aimed to gain deeper insights into the relationships and structures within our data, potentially revealing new factors that contribute to the therapeutic alliance and treatment outcomes. Despite the initial low Silhouette Scores, these efforts are crucial for exploring hidden dimensions and improving our overall understanding of the data landscape.	

- Team communication and collaboration

1. We schedule regular team meetings every Wednesday and Saturday, with occasional additional meetings on Thursday, to discuss progress, challenges, and next steps.
2. We share regular updates on everyone's progress during these meetings.
3. We discuss insights from our meetings with Greenspace and split our tasks accordingly.

- Clear work plan with tasks assigned to each person for the next week

Group Member	Next Week Tasks Assigned
Kohsin	Since caseloads serve as a matching criteria for therapist- patient matching, try to identify caseloads for every therapist.
Zerui	Find the most frequently assigned assessments by each therapist to determine their specialty.
Zheng	Determine the proportion of patients who show improvement under each therapist, segmented by assessment type.

Bingshen	Look at only the latest TA assessment score instead of averaging all the scores, only include the patient's last TA assessment, and compare that to the first TA score of that patient. What's the improvement? Which therapists have the highest (and lowest) improvement in TA?