AbstractID: 4617 Title: Statistical Analysis of Respiratory Motion and Knowledge Discovery

Purpose: IGRT is a recent advancement in the treatment of cancer that presents a great potential to increase the efficiency of treatment of tumor in the lower abdomen and lungs. However, the efficacy of treating tumors with radiation in these locations is often degraded by tumor respiratory motion. Therefore, the characterization and prediction of tumor motion aids in the precision of radiotherapy treatment. We hereby propose a knowledge discovery solution based on the correlation of the patient biomedical data and the tumor motion data for accurate tumor motion characterization and prediction.

Method and Materials: For the analysis of biomedical data, we worked through the main steps involved in a typical knowledge discovery analysis. An important phase includes the analysis of a large spectrum of biomedical data falling into several categories such as tumor description data, and patient treatment data in order to select the set of features to be considered for the mining process. We used clustering techniques such as K-means clustering to group patients based on a selected set of biomedical data attributes.

Results: Comprehensive preprocessing of the raw clinical data and several experiments were performed to identify stable patient clustering. The clustering results were graphically represented using the tumor location of patients for further analysis, which clearly demonstrate certain consistency among the grouping of patients based on their biomedical information. We have compared our clustering results with the current tumor location representation based on bronchopulmonary segments.

Conclusion: Patient biomedical data is a rich set of information that has the great potential in tumor characterization and predication especially for the treatment of patients with little or no tumor motion data. Combining the biomedical information and tumor motion data to explore the correlation among them will yield more accurate tumor motion predication.

Conflict of Interest (only if applicable):