عنوان مقاله:

Random-Forest Model Prediction of Dose Distribution In InsensityModulated Radiation Therapy (IMRT) Planning for Lung Cancer

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خلاصه مقاله:

Introduction: Machine-learning models have been widely used to predict dose distribution in therapy planning such as Intensity Modulated Radiation Therapy (IMRT). Random-forest is one of the machine learning models which can reduce output bias by using the average value all of estimators.Material and Methods: Planning data in Digital Imaging and Communications in Medicine (DICOM) format is exported to Comma Separated Values (CSV). Then, used to random-forest algorithm that will be trained using ۷-fold validation and then the model will be evaluated with new data, i.e., data that the model has never seen before. The data evaluated were the parameters to obtain Homogenety Index (HI) for the target organ, whereas the mean and max dose for organs at risk (OARs) were evaluated. Statistical analysis were also carried out to assess the significant difference between the predicted value and the true value.Results: Random-forest was able to predict the true value with errors evaluated using Mean Absolute Error (MAE) on Planning Target Volume (PTV) features D۲ (۰.۰۱۲), D۵۰ (۰.۰۱۵) and D۹۸ (۰.۰۱۸) as well as at OAR features (Dmean and Dmax) of the right lung (۰.۱۰۴ and ۰.۲۲۸), left lung (۰.۰۹۴ and ۰.۲۷), heart (۰.۰۸۸ and ۰.۲۶۷), spinal cord (۰.۰۶۹ and ۰.۱۲۱) and (V۹۵) Body (۰.۰۹۴). Based on the results of statistical tests, p >۰.۰۵, there is no significant difference between the two data.Conclusion: Random-forest regressor is able to predict the dose value with the smallest difference in PTV features.

کلمات کلیدی:
Radiation Dose Prediction Instensity, Modulated Radiotherapy Machine Learning

لینک ثابت مقاله در پایگاه سیویلیکا: