Using Artificial Intelligence to Predict Survival in Patients with Prostate Cancer

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Prostate cancer is the most common cancer in men in the United States. Death in prostate cancer patients is often related to medical conditions other than prostate cancer itself. Hence, it is important to predict survival so personalized care can be offered to the patients. The researcher developed a simple and credible model for estimating all cause-mortality in patients with prostate cancer using inputs of age, race, comorbidities, and baseline PSA. The researcher used a de-identified database of approximately 1000 patients with prostate cancer diagnosed between 1995-2016. After cleaning the data and omitting confounding variables, the database contained approximately 800 patients. The researcher ran different statistical and computer models to develop an accurate model to determine survival. This was done by breaking the dataset into training and testing subsets. The best algorithm was neural network regression with a Stochastic Gradient Descent optimizer and mean absolute error loss. This model had a mean squared error of approximately 1.75 months. Finally, the researcher created an intuitive user interface for doctors to use at bedside. The researcher believes that this customized survival estimation will provide valuable information to oncologists on top of the traditional TNM cancer staging. This can guide which patient needs aggressive therapy versus not, hence protecting patients from unnecessary side effects, improving quality of life and saving health care dollars. Integrating Artificial Intelligence in medical decision-making can lead to the development of personalized care plans for cancer patients based on age, ethnicity, and co-morbidities.

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