A Mathematical Study of Gastric and Prostate Cancer Based on Fuzzy Soft Set Theory

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Abstract

Cancer is one of the most severe public health issues in today's world, and the diagnosis of cancer is often associated with uncertainty, vagueness, incomplete information, and subjective medical judgment. Generally, classical mathematical models are helpful when the data available is accurate; but in the case of gastric cancer and prostate cancer, clinical data often contains imprecision, as they may include symptoms, risk factors, interpretation of the imaging and results of the lab tests that are not entirely crisp. This is the reason that soft computing methods, particularly fuzzy soft set theory, offer a helpful tool to model uncertainty in medical decision making. This paper provides a mathematical investigation of the gastric cancer and prostate cancer via fuzzy soft sets. The goal is to demonstrate the application of fuzzy soft set theory to the structuring of the uncertain diagnostic parameters, the assessment of the patient's condition and the classification of the severity of the disease. The basic theory of fuzzy soft sets is introduced and a parameterized model for the cancer analysis is developed and the membership values of the clinical indicators of gastric and prostate cancer are assigned. Then, a comparative discussion is provided to show the applicability of fuzzy soft set method in dealing with heterogeneous clinical information. Based on the results of the study, fuzzy soft set based models are found to be appropriate mathematical models for medical diagnosis as they are a flexibly and interpretable combination of both parameterization and fuzziness.

Keywords

Medical diagnosis, gastric cancer, prostate cancer, uncertainty modelling.