Abstract

*Cancer is a deadly disease with a minimal chance of survival. Therefore, cancer diagnostics is a quite sensitive and complex process. In order to save a patient's life and cancer expansion, it must be discovered timely and accurately. Head and neck cancers are the sixth most prevalent type of malignancy worldwide. In 2020, an approximately 562,338 individuals were diagnosed with head and neck cancer globally. Typically, "**fine needle aspiration**" a type of invasive biopsy procedure, is performed to determine the grade of head and neck cancer by inserting a fine needle into the skin and sucking up some cells and fluid with that needle. Alternatively we can remove organ tissue. In this study, we propose a non-invasive technique by adopting formal methods approach for determining the grade of head and neck cancer grade by computing radiomic biomarkers from MRIs(magnetic resonance images). Furthermore, the proposed method predicts whether the cancer can be treated surgically or not based on the pathologist's and surgeon's suggestions. Initially, we represent the patient's MRIs in form of formal models, and after that we develop a set of properties with the aim of predicting the cancer grade and treatment. The properties are verified on real-world data-sets comprised of 20 patients using a formal verification environment, proving the effectiveness of the proposed method.*