

Smart approach for medical diagnostic

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Cancer is a major public health problem in the world. which is a Group of diseases that can start in almost any organ of the body. The affected cells of the body by cancer become abnormal and start growing uncontrollably and spread to other parts of the body [1], According to WHO, Cancer is the second leading of death in the world. accounting for an estimated 9.6 million deaths, or 1 in 6 deaths, in 2018. Thyroid gland cancer is the 9th most commonly affected cancer in the world with 586 202 new cases in 2020 according to GLOBOCAN. The women have the highest number of cases than men. Where women account for approximately 75% of all patients with thyroid cancer[2], [3]. The thyroid gland is a part of the endocrine system, shaped like a butterfly. wraps the trachea. Which plays a role in releasing hormones T3, and T4 that are responsible for the process of converting the food to energy [4]. In the last decade, the care of thyroid cancer has been transformative with new management options, for reducing the overdiagnosis that causes overtreatment of low-risk thyroid cancer.[2]. Overdiagnosis is a hot issue that can cause serious harm: (Unnecessary surgery with potential Complications, Personal and societal costs of treatment, Psychological effects of a cancer diagnosis and Decreased quality of life after cancer diagnosis). The averting of overdiagnosis is difficult to achieve. so that Not all patients with progressive, metastatic thyroid cancer have palpable thyroid nodules, and not all diagnoses of the lowest-risk thyroid cancers are avoidable [2].

Deep learning is a subdiscipline of artificial intelligence that uses a machine learning technique called artificial neural networks to extract patterns and make predictions from large data sets. and CADe (Computer-aided-detection), CADx (Computer-aided-diagnosis) and CAP (Computer-aided-prediction) are famous implementations of AI that can be involved in numerous fields (industries, healthcare. etc.). these systems play a significant role in decreasing the false values of experts. and give more accurate results [5][6]. however, there are problems that prevent such systems:

- Accuracy: Accuracy is represented as the main point in such systems. and despite the high accuracy declared in the literature. it steels problems in generalisation. this last one prevents such systems to prevalent in the healthcare field [4].
- Explainability: Explainability is a critical problem in front of the implementation of these systems. explainability in a nutshell is the ability of such systems to explain their results. and that allows doctors to verify and make it reliable[7].
- Full integrated system: as to our knowledge there is no fully integrated system in the literature. the advantage of existing such systems that include (CADe, CADx, CAP) is a huge impact on Accuracy, sensitivity and specificity. and PHM framework (Prognosis and health management) considers promising frameworks for such systems.

Considering, the revolution of AI and emerging new technology and decent data availability. It has motivated us to enhance AI-based computer aid system for diagnosis (CAD) and prognosis (CAP), for helping doctors to manage differentiated thyroid carcinoma taking into account the changes that occur in Oncology and the advances in AI.

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