

Machine learning & semantic web technologies for cancer care

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VALORIZATION ADDENDUM

The societal trends such as an ageing population, rising costs of healthcare expenditure, lack of skilled healthcare workers is forcing the healthcare industry to adopt newer solutions improving affordability and access to care. The availability of the right technologies is facilitating this transformation^[1].

Royal Philips is a leading health technology company focused on improving people's health and enabling better outcomes across the health continuum from healthy living and prevention, to diagnosis, treatment and home care. The vision of Philips is to improve the lives of 3 billion people a year by 2030^[2].

As a Philips employee, the work on the thesis has influenced and contributed to the products and solutions as described in the paragraphs below.

Knowledge Dissemination

In addition to the knowledge sharing by publishing papers, the concepts and software developed as part of the thesis were shared amongst researchers at Maastricht University. The RDF graphs created for the work on Semantic representation of Radiotherapy Data for effective data mining and the RDF code created in Authorization Framework for Medical data was shared with the SEDI project team at Maastricht University, as a cross-sharing and learning initiative.

Chapter 7, Role of Fractals in histology classification for non-small lung cancer, is published as book chapter for the scientific community to follow. Classification based on fractals are expected to identify tumor habitats within the gross tumor volume. Finding of these habitats would be useful in targeted therapy for better prognosis.

Economical Exploitation

This thesis has contributed to solutions addressing the needs of patients, hospitals, and research institutes. A health technology company such as Philips Healthcare can valorize the following results of this thesis.

1. Data mining and semantic representation of clinical reports can be very useful for the clinical community for diagnosis and treatment pathways. The concepts and techniques proposed in chapters 2,4 and 5 can be part of a Philips platform providing the necessary infrastructure to mine clinical insights while adhering to strict privacy and security guidelines.
2. The de-identification models developed in Chapter 3, for text de-identification shall be part of the latest version of Philips HealthSuite Digital Platform (HSDP)^[3].
3. The Radiomics models developed in chapter 6 and 7, automatic classification of tumor histopathology and Fractal Analysis for non-small lung cancer, are currently being verified and validated as part of the Philips Translation Research platform – IntelliSpace Discovery^[4]. Based on the outcome of the validation phase, the models could become part of the Philips IntelliSpace Portal^[5], in the near future.
4. Cloud based distributed learning for model training is gaining importance due to data privacy and security guidelines as in the latest EU General Data Protection Regulation GDPR^[6]. The proposed research concepts in Chapter 8, “Cloud based Big data platform for image analytics” can be part of a Philips cloud-based solution for distributed learning.

Societal Expectation Management

In addition to likely economic benefit and knowledge sharing, the work done in this thesis has a larger influence on society. The technology to share the relevant clinical insights between hospitals across the globe, while adhering to privacy and security guidelines, shall enable researchers and clinicians to collaborate seamlessly and improve disease diagnosis and treatment at a rapid pace.

At the primary care level, the cloud-based platform for image analytics, described in Chapter 8, can provide telemedicine capabilities, connecting the experienced radiologists practicing in the large cities to physicians in remote villages and towns^[7].

Similarly, the clinical decision support systems deployed on a cloud-based platform can empower physicians and healthcare workers in primary care to improve their diagnosis and treatment strategies.

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