3rd ESTRO Physics workshop: Science in development
25-26 October 2019, Budapest, Hungary

Multi-source data fusion for decision support systems in radiation oncology: opportunities, methodologies, standardizations and clinical translation

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Motivation:
Medical images embed valuable quantitative information (e.g. -omics) that can be extracted and used to support treatment decisions and outcome predictions/evaluations in radiation oncology. Additional sources of information collected during clinical procedures or research can be retrieved, such as survival, toxicity data, tumor genetics, blood samples, daily treatment planning data, etc. Although there is a huge potential to combine this data into a useful multi-source data pool, it is currently barely used by clinicians as part of their decision support systems. Issues related to standardization, reproducibility, robust methodological approaches and data sharing are fundamental to push recent developments in multi-source data science into the clinic. Furthermore, several IT companies are entering the market proposing similar products for mining medical data. In data science, the term FAIR – Findable, Accessible, Interoperable and Reusable, provide guidelines for development and publication of multi-source data and have been rapidly adopted by publishers, funders and societies. However, in radiation oncology there is a lack of a unified community that currently limits the spread and definition of common guidelines or recommendations that can speed up the translation of multi-source data into decision support systems in the clinics.
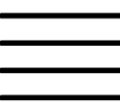
The aim of this workshop is to bring medical physicists together with other disciplines (data scientists, radiation oncologists and radiation biologists) in order to:

1. define a common vision for multi-source data science in radiation oncology
2. share/improve tools, methodologies and big data mining infrastructures already developed by single groups/institutions
3. bridge different disciplines for the optimal development of multi-source decision support systems in radiation oncology
4. ultimately define a broad research community for data-driven medicine

This being a workshop we want to encourage an active participation and interaction between the participants to foster collaboration and networking. For that reason, participants will be requested to prepare a short presentation (a pitch) to present their research in the field allowing identification of common points of interests and share experiences.

Outcome:
The potential outcome of the workshop will be a white paper based on FAIR principles presenting the vision, mission and tools for wide-spread use of multi-source data science within the radiation oncology Community.

Day 1	**Friday 25 October**
08:00	Registration opens
09:00-09:15	Introduction of the meeting: **Núria Jornet,** Overall Chair of workshop (All)
09:15-10:00	Opening lecture All participants • Robert Jeraj - *Medical physics got stuck in a box - how to get out*
10:00-10:30	Coffee
10:30-12:30	Opening session (by chairs) – 5 minutes Imaging (radiomics) – methdologies and standardization – **Alex Zwanenburg (**15 min) 2 to 3' pitch presentations by participants (to be decided when final registration list is known) 60' discussion on the topics
12:30-13:30	**Lunch**
13:30-15:30	Infrastructure and multi-source data fusion – **Andre Dekker** (15 min) 2 to 3' pitch presentations by participants (to be decided when final registration list is known) 60' discussion on the topics
15:30-16:00	Coffee
16:00-17:00	Wrap up of the different topic workshops (12 min per topic) All

Day 2	**Saturday 26 October**
08:00-10:00	How to make multi-source data clinically useful? - **Joanna Kazmierska** (15 min) 2 to 3' pitch presentations by participants (to be decided when final registration list is known) 60' discussion on the topics
10:00-10:30	Coffee
10:30-12:30	Summary, highlights, discussion on next steps, identify open issues for further research, outlining the paper
12:30-13:30	**Lunch/commercial symposia**
13:30-14:30	Workshops: Discussion on next steps; take home messages
14:30-15:30	Wrap up: highlights of the different workshops (12 min per topic) All
15:30-15:45	Closure

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