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Letter to the Editor

RE: Cognitive Algorithms and Digitized Tissue-based Diagnosis. Jürgen Görtler, Klaus Kayser, Stephan Borkenfeld, Rita Carvalho, Gian Kayser. Diagnostic Pathology 2017, 3:248

Large Format Histology, Whole Slide Imaging and Multi-Criteria Decision Making

Silvia Gasparrini[1], Maria Alessandra Montironi[2], Alessia Cimadamore[1], Antonio Lopez-Beltran[3], Liang Cheng[4], Marina Scarpelli[1] and Rodolfo Montironi[1]

[1]Section of Pathological Anatomy, Polytechnic University of the Marche Region, School of Medicine, United Hospitals, Ancona, Italy;

[2]Department of Mechanical and Aerospace Engineering, University of California, Davis, CA, USA;

[3]Pathology Service, Champalimaud Clinical Center, Lisbon, Portugal, [4]Department of Pathology and Laboratory Medicine, Indiana University School of Medicine, Indianapolis, USA

Correspondence to: Rodolfo Montironi, Pathological Anatomy, Polytechnic University of the Marche Region, School of Medicine, United Hospitals, Via Conca 71, I–60126 Ancona, Italy. Phone +39 071 5964830. Fax +39 071 889985. E-mail: r.montironi@univpm.it

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Abstract

Background: Several algorithms can be used in "Cognitive Algorithms and Digitized Tissue-based Diagnosis". As revised by Dr. Jürgen Görtler et al, these can be grouped can be grouped in 'self learning', self promoting', 'self targeting', 'self exploring' and 'self networking' [1]. We agree with Dr. Jürgen Görtler and his group in identifying promising similarities in the methods developed for situation assessment and tactical decision making in self-driving cars and in those needed for automated diagnostics.

Keywords: Multi-Criteria Decision

We read with great interest the paper published in Diagnostic Pathology by Dr. Jürgen Görtler et al entitled "*Cognitive Algorithms and Digitized Tissue-based Diagnosis*" [1]. In this paper the authors analyze "the nature and impact of cognitive algorithms and programming on digitized tissue-based diagnosis". In particular, they "describe and analyze the principle construction, features, benefits and limitations of programs that are arising at the horizon of diagnosis in surgical pathology".

Dr. Jürgen Görtler et al's contribution [1] led us, a transnational group of pathologists, computer scientists, and engineers, to make considerations on our current and future role in the era of Whole Slide Imaging (WSI) of the so-called Large Format Histology (LFH) (or whole mount sections) in the field of surgical pathology [2,3,4].

In the last few years we have scanned several cases processed with the whole mount section technique and acquired a unique experience in the joint evaluation with clinicians of virtual slides from large format histology, basically related to the field of urogenital neoplasms [2,3,4].

The main advantages with digitalization of whole mount sections are consultation and remote interpretation, image analysis, and direct integration with information from surgery and imaging techniques, for instance multiparametric Magnetic Resonance Imaging [2-5]. All this requires integrating our knowledge in surgical pathology with informatics and engineering. In particular, the integration of LFH-based virtual slides in a complex inference framework based on Bayesian belief networks or neural networks has been a useful tool in the process of formalizing and sharing diagnostic criteria and procedures. The process of

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translating expert knowledge into such models and algorithms has proved a valuable tool by stimulating the identification of cause-effect links at the basis of the diagnostic process [2, 3, 4, 5, 6].

Diagnostics is a complex endeavor that requires integrating in a context-dependent manner information from different sources and arbitrating between often conflicting criteria, both of which are tasks commonly performed by a human expert. Preliminary approaches that consider the use of technology and of approaches derived from the field of artificial intelligence have highlighted the usefulness of these methods in improving the accuracy of the diagnostic process beyond that of the individual expert. In fact, methods such as machine learning, probabilistic inference, and multi-criteria decision-making can provide tools for enhancing the quality of information available and for reducing the uncertainty in the diagnostic process [2-7]. Further investigation into the application of such methodologies is definitely necessary.

In conclusion, several algorithms can be used in "*Cognitive Algorithms and Digitized Tissue-based Diagnosis*". As revised by Dr. Jürgen Görtler et al, these can be grouped can be grouped in 'self learning', self promoting', 'self targeting', 'self exploring' and 'self networking' [1]. We agree with Dr. Jürgen Görtler and his group in identifying promising similarities in the methods developed for situation assessment and tactical decision making in self-driving cars and in those needed for automated diagnostics [1].

Conflicts of interest: The authors have nothing to disclose.

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