the diagnostic pathology journal DIAGNOSTIC PATHOLOGY

13th European Congress on Digital Pathology Proceedings, diagnostic pathology 2016, 8:187
ISSN 2364-4893
DOI: http://dx.doi.org/10.17629/www.diagnosticpathology.eu-2016-8:187

Proceedings

SY12.06 | **eLearning**

VIRTUAL PATIENTS AND SERIOUS GAMES IN MEDICINE

P. Siregar*, N. Julen

Integrative Biocomputing, Centre d'Affaires Buro Club, Place du Granier, 35135 Chantepie, France

Introduction/ Background

Serious games (SGs) are immersive learning and training tools. They have gained a widespread interest worldwide and are gaining ground with respect to formal education. Most serious games follow a learn-by-doing pedagogic principle. One of the main advantages of this approach resides in the fact that people retain 90% of what they do as opposed to 10% of what they read [1]. It is also a very efficient means to transform theory into best practices and promote problem-solving competencies. SGs can be developed to diagnose virtual patients that incorporate real data. The educational goals should include: (1) how to make the most out of the patient history and the physical examination by notably acquiring a good knowledge of pathophysiology, (2) request tests/ exams that are the most appropriate with the current differential diagnosis (3) interpret the tests/exams results within a global patient view.

Aims

We describe diagnostic concepts that can be incorporated in serious games dedicated to medicine. Diagnosis can be modeled as an iterated hypothetico-deductive loop (HDL): collect/elicit patient data, evaluate them, establish a differential diagnosis, repeat the HDL if needed. The initial steps of diagnosis consist of assessing the chief complaints and proceeding to a thorough history [2]. The differential diagnosis allows the physician to focalize his/her attention on specific body regions and anatomical systems during the physical examination leading to (perhaps) more specific hypotheses. When more than one hypothesis remains, diagnosis can be refined by requesting complementary exams leading to a new HDL. An IT approach to diagnosis can be built around the combination of expert heuristics[2], pathophysiology [3] and concepts burrowed from evidence-based medicine (EBM) [4,5], where decisions are based on weighted evidence. The generation of hypotheses during the initial steps is based on the prevalence of diseases that allow estimating prior probabilities. Post-test probabilities can then be established at the end of each HDL. Where appropriate, the choice of complementary exams will depend on two strategies: attempt to confirm the most probable hypotheses (given the current evidence) and attempt to refute potentially high-risk hypotheses. In short, this means selecting of exams that are specific (for confirmatory purpose) and/or sensitive (for refutation purpose). In Digital Pathology (DP), these considerations can help learners evaluate the cost of making false-positive and false-negative errors. For instance, a false-negative error in the context of a high-risk disease can be costly to the patient. Hence a global understanding of the patient case and a risk assessment of the competing hypotheses can help students in DP stratify the search of regions of interests (ROI) because they would know what image features they should attempt to confirm or refute first.

Results

We are currently developing a technology platform dedicated to the realization of serious games in medicine. It incorporates generic reasoning modules that can combine expert heuristics, pathophysiology with concepts of EBM. Since annotated DP WSI can be integrated within the patient cases, such tools will contribute to illustrate (1) how applied sciences, medical devices and information technologies have become an integral part of modern medicine, and (2) how each piece of information can contribute to an integrated approach to patient diagnosis and treatment.

the diagnostic pathology journal DIAGNOSTIC PATHOLOGY

13th European Congress on Digital Pathology Proceedings, diagnostic pathology 2016, 8:187
ISSN 2364-4893
DOI: http://dx.doi.org/10.17629/www.diagnosticpathology.eu-2016-8:187

Figure 1.

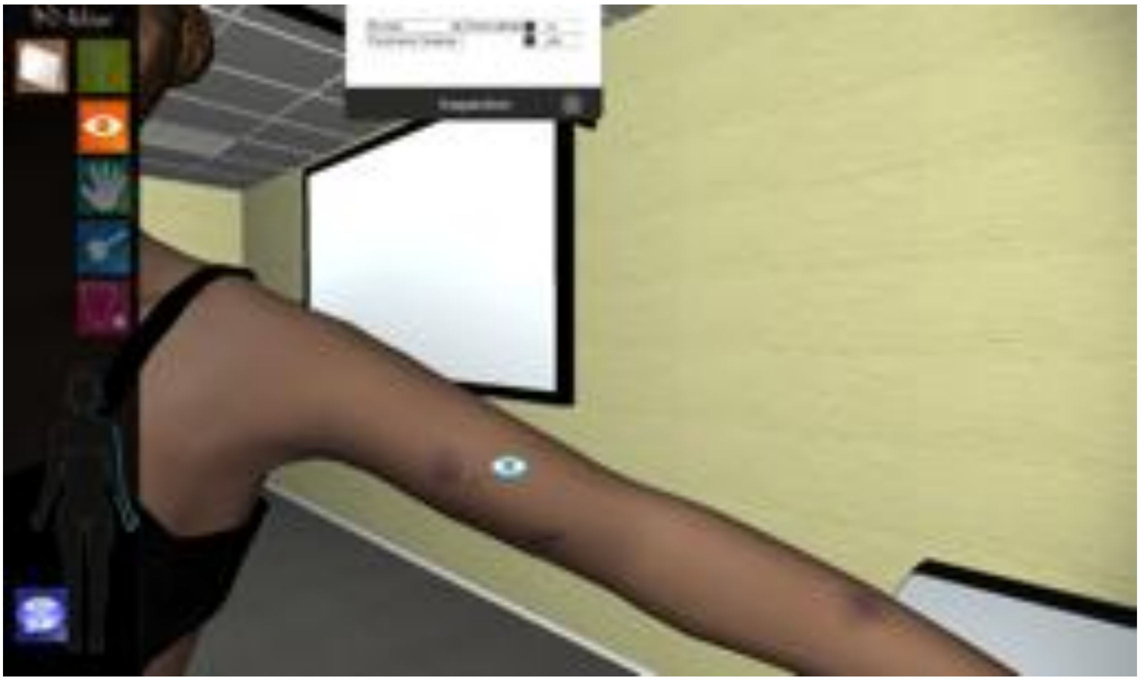

Figure 2.

References:

[1] Federation of American Scientists, Harnessing the power of videogames for Learning, Federation of American Scientists, Summit on Educational Games 2006, Available from: http://www.informalscience.org/sites/default/files/Summit_on_Educational_Games.pdf

[2] Fauci A.S., et. al., Harrison's Principles of Internal Medicine (19th Edition), McGraw Hill, 2015, ISBN-13: 978-0071802154

[3] Boron W.F., Boulpaep E.L., Medical Physiology (2nd Revised Edition), Elsevier Saunders, 2012, ISBN-13: 978-1437717532

the diagnostic pathology journal DIAGNOSTIC PATHOLOGY

13th European Congress on Digital Pathology Proceedings, diagnostic pathology 2016, 8:187
ISSN 2364-4893
DOI: http://dx.doi.org/10.17629/www.diagnosticpathology.eu-2016-8:187

[4] Wulff H.R., Gotzche P.C., Rational Diagnosis and Treatment: Evidence-Based Clinical Decision-Making (4th Edition), Blackwell Science, also Wiley-Interscience, 2008, ISBN-13: 978-0470515037

[5] Katz D.L., Clinical Epidemiology and Evidence-Based Medicine, Sage Publications ,2001, ISBN-13: 978-0761919391