TESLA Editor for TAO e-assessment platform: a simple way to describe the complex scoring variables

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Abstract:

This paper describes the TESLA authoring tool for creating scoring variables in the domain of complex problem solving. Its principles and high-end features will be demonstrated.

1 Context

The result management plays a major role in CBA (Computer Based Assessment). A large community of researchers addressed this issue in order to propose appropriate solutions for scoring.
However, most systems show some weaknesses. Indeed, they develop a scoring based on the final result. This solution is clearly a partial one since it does not solve scoring based on the test taker's strategy to solve a rich and complex item. We need more than right or false answers to evaluate the way the test taker behaves to solve the problem.
In our previous work [3], we addressed the issue which consists in assessing the strategy used by the test taker for problem solving thanks to the TESLA component (TAO Event based Scoring using Log Analysis Techniques) [1]. It constituted an important enhancement for the Result module of the TAO platform, and it has already been used in important projects such as the OCDE PIAAC [2]. Even though the TESLA component is currently operational, IT competencies are still required to create scoring variables according to psychometricians' definition. Indeed, they remain too complex because they are based on XML syntax.
In our work, we improve existing solutions thanks to our visual component namely the TESLA editor. Such a visual editor provides not only a flexible solution but moreover, it enables an easier way to define scoring variables that match the strategy used to solve problems.

2 Contribution

In order to overcome scoring challenges, the TAO platform integrated the TESLA component that tends to improve the existing solutions on three aspects: a flexible definition of score variables in pre and post tests; an efficient mechanism to calculate score values and data captured based on collected events and the variables' definition; the support of scoring based on the analysis and processing of complex patterns met in the sequences of collected events.

The central point of our approach is to use some ideas from the well known domain of CEP (Complex Event Processing) in order to establish a scoring mechanism. Since CEP is largely used in a lot of critical domains (such as the security, attack detection, business profiling), we claim that the existing works in CEP is an excellent source of inspiration that helps us in our

approach. Even though the TESLA component is being used in TAO it lacks a suitable and efficient way to define the complex variables.

The objective of this work is to enhance the TESLA component in order to propose a visual authoring tool to facilitate the creation of complex scoring variables. The main benefit is to hide the complexity of the variable description process. The TESLA Editor constitutes an important part of the TAO platform and its result extension. The editor allows the creation and the generation of the XML description of the variables and ensures the facilities to manage these variables within the TAO ontology. This will reduce the gap between the psychometricians' definition and the real creation of these kind of complex scoring variables. The editor is implemented as a Rich web client by using web standard technologies in order to guarantee its deployment over different platforms. The main features of the editor are:

- To allow the creation of the XML description of the variables based on the proposed XML language.
    - To propose a suitable wizard to help designer In his definition
    - To hide the complexity of the XML and the Complex Event Processing characteristics
    - To manage the strategy pattern building.
- To save the variables' description in the Result ontology of TAO
- To allow manual modification on the proposed description (write directely in XML for advanced users)
- To use of rich client technology for the implementation (AJAX, jQuery core, jQuery UI) and XML manipulation.
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3 Conclusion

The quality of scoring is an essential and complex feature of the e-assessment process. The TESLA component is an innovative answer to the issues derived from common authoring tool. Indeed, TESLA enables to decrypt the answers and behaviours of complex items. The main contribution of our work is to provide a visual editor for this component. TESLA editor enables a simple user of the TAO platform to manipulate it and extract rich information for an enhanced scoring of test takers.

References:

[1] TAO platform is located and documented at: http://www.tao.lu
[2] OCDE PIAAC (Programme for the International Assessment of Adult Competencies)
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