Contribution ID: **132**   Type: **oral**

Knowledge, Skills and Competence Modelling in Nuclear Engineering Domain using Singular Value Decomposition (SVD) and Latent Semantic Analysis (LSA)

Thursday, 10 November 2016 09:15 (15 minutes)

The European Qualifications Framework categorizes learning objectives into three qualifiers "knowledge", "skills", and "competences"(KSCs) to help improve the comparability between different fields and disciplines. However, the management of KSCs remains a great challenge given their semantic fuzziness. Similar texts may describe different concepts and different texts may describe similar concepts among different domains. This is difficult for the indexing, searching and matching of semantically similar KSCs within an information system, to facilitate transfer and mobility of KSCs. We present a working example using a semantic inference method known as Latent Semantic Analysis, employing a matrix operation called Singular Value Decomposition, which have been shown to infer semantic associations within unstructured textual data comparable to that of human interpretations. In our example, a few natural language text passages representing KSCs in the nuclear sector are used to demonstrate the capabilities of the system. It can be shown that LSA is able to infer latent semantic associations between texts, and cluster and match separate text passages semantically based on these associations. We propose this methodology for modelling existing natural language KSCs in the nuclear domain so they can be semantically queried, retrieved and filtered upon request.

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Session Classification: Technical Session 14

Track Classification: Track 8: Issues and approaches for information, records and data management