Assessing Academic Staff Performance using Multiple Criteria Evaluation Models

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Abstract

Various academic staff evaluation models were subjected to detailed analysis. The routine use of weighted mean as a sole aggregation operator proved inappropriate for aggregating evaluations from different academic areas (lecturing, R&D, management). Even more general aggregation operators (OWA, WOWA) still leave some room for improvement. To objectively assess benefit of an individual staff member, the use of a fuzzy rule base in aggregating partial evaluations proves optimal. Our proposed linguistic fuzzy evaluation model is currently being implemented at Palacky University Olomouc.

Keywords: academic staff, evaluation, aggregation operators, fuzzy expert system

1. Introduction

This paper describes a model of academic staff evaluation, developed and successfully tested on the Faculty of Science, Palacky University Olomouc (Czech Republic).

2. Analysis of academic staff evaluation models

We have examined various academic staff evaluation models currently used on universities both in the Czech Republic and abroad (USA, Canada, Australia). These models were subjected to a detailed analysis regarding their practical and mathematical aspects. The analysis resulted in the design of several academic staff evaluation models (e.g. Talašová and Pavlačka, 2006) differing in how members of academic staff are evaluated in separate areas of their activity and in the aggregation method for these partial evaluations (weighted arithmetic mean, OWA, WOWA – for more details about aggregation operators see Torra and Narukawa, 2007). Considering the faculty management requirements on the behaviour of evaluation function, the following model (described in detail in Talašová et al., 2009) was eventually chosen.

3. Problem specification

General requirements on the model were as follows: It should (1) include, if possible, every aspect of academic staff activity; (2) use only easily proven and objective data; and (3) be easy to work with. Other requirements were for the final evaluation: (4) to maximally reflect staff benefit to the faculty; and (5) not to be a simple average of partial evaluations in separate areas of activity. The desired output of the model was not to arrange members of academic staff in order of their performance, nor to obtain a single number interpretable only with difficulty. A basic piece of information on both focus and performance of the academic staff

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was considered sufficient. Such assignment implied the use of linguistic fuzzy modelling: linguistic variables, rule bases, and approximate reasoning - i.e. of linguistically oriented fuzzy expert systems (see Dubois and Prade, 2000, Talašová, 2003).

4. Structure of the proposed model

The performance of each member of academic staff is evaluated in both pedagogical, and research and development (R&D) areas of activities. Input data are acquired from a form filled in by the staff where particular activities are assigned a score according to their importance and time-consumption. Three areas are taken into consideration for pedagogical performance evaluation: (a) lecturing, (b) supervising students, and (c) work associated with the development of fields of study. The evaluation of research and development activities is based on the R&D methodology of evaluation valid in the Czech Republic (evaluating papers in important journals, books, patents etc.) but other important activities (grant project management, editorial board memberships etc.) are also included. Both pedagogical and R&D areas are assigned standard scores – different for senior assistant professors, associate professors, and professors. The number representing a partial evaluation of a member of academic staff in a certain area is determined as a multiple of the respective standard for his or her position. For better clarity and easier interpretation, these numbers are transformed into verbal evaluation using linguistic scales.

A linguistic fuzzy expert system is therefore used to aggregate both partial evaluations – for pedagogical and R&D areas of activities. The main advantage of this type of aggregation is that it allows to set-up the shape of the aggregation function completely in line with the evaluator’s requirements (e.g. to appreciate excellence achieved in one of the areas). This type of aggregation is transparent and comprehensible even to a layman as it is described in linguistic terms. The overall aggregated evaluation is also available as a linguistic expression.

Our model also takes into account the load of secretarial and managerial activities with each member of academic staff (understood here as activities draining away from his or her time and thus reducing the performance in each of the two areas of evaluation mentioned above). Another fuzzy expert system is used to adjust the evaluation according to the secretarial and managerial activities load of the particular academic staff member. The overall work load of members of academic staff is thus described verbally.

5. Conclusion

We have developed a model that meets the above mentioned requirements. Linguistic fuzzy modelling proved to be a valuable tool for academic staff performance assessment.

6. References


Talašová, J., Pavlačka, O.: Academic staff evaluation model design for the Faculty of Science, Palacky University in Olomouc (in Czech). Research report. Faculty of Science, Palacky University, Olomouc 2006.