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K-Nearest Neighbour algorithm coupled with logistic regression in medical case-based reasoning systems. Application to prediction of access to the renal transplant waiting list in Brittany

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Introduction. Case Based Reasoning (CBR) is an emerg- ing decision making paradigm in medical research where new cases are solved relying on previously solved similar cases. Usually, a database of solved cases is provided, and every case is described through a set of attributes (inputs) and a label (output). Extracting useful information from this database can help the CBR system providing more reliable results on the yet to be solved cases. Objective. For that purpose we suggest a general frame- work where a CBR system, viz. K-Nearest Neighbor (K-NN) algorithm, is combined with various information obtained from a Logistic Regression (LR) model. Methods. LR is applied, on the case database, to assign weights to the attributes as well as the solved cases. Thus, five possible decision making systems based on K-NN and/or LR were identified: a standalone K-NN, a standalone LR and three soft K-NN algorithms that rely on the weights based on the results of the LR. The evaluation of the described approaches is performed in the field of renal transplant access waiting list. Results and conclusion. The results show that our suggested approach, where the K-NN algorithm relies on both weighted attributes and cases, can efficiently deal with non relevant attributes, whereas the four other approaches suffer from this kind of noisy setups. The robustness of this approach suggests interesting perspectives for medical problem solving tools using CBR methodology.

Submission history

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