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Computer-Aided Estimation Of Comorbidity From Electronic Patient Medical Records For Joint Register Data

General Topics / Methodology

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Background
It is common practice in register studies to use administrative data sets for extraction of diagnostics codes in order to identify comorbidities and summaries them as indices. Some software exist to facilitate this process but they can be either expensive, hard to understand or slow for computing, especially if used for large cohorts and data sets.

Objectives
It was our intention to develop a free and open source software package with an easy to use interface that can process large sets of patient data within minimal computing time.

Study Design & Methods
We designed a software package called "classifyr". The name reflects (1) that it can be used for all sorts of classification where units (patients) are grouped into categories such as comorbidity classes, and (2) that it is designed as an add-on package for the free and widely used statistical software R.

We centered the package interface around three objects: (1) a data set with unit (patient) data, (2) an additional data set with classification data such as diagnostic codes and (3) a classification scheme linking individual (diagnostic) codes to (comorbidity) categories by regular expressions.

The user can either rely on default schemes included in the package, or specify his own. We currently include comorbidity schemes based on ICD-10 and different versions of the Charlson, Elixhauser and comorbidity-polypharmacy score, adverse events classification for patients with total hip arthroplasty and medical identification through ATC-codes and RxRiskV.

Results
We used the package with (1) a data set including patients with total hip arthroplasty (THA) and (2) with all their hospital visits during the year preceding surgery. ICD-10-codes for patients in (1) from data source (2) was classified by both an Elixhauser and a Charlson comorbidity classification scheme (3). The first classification attempt was made without the package and took 18 hours with a moderately modern computer. The same task was then performed with the package and took only seconds. This was also 80 and 450 times faster compared to two other R-packages with similar purpose.

Conclusions
The R-package "classifyr" is freely available. It is easily extensible to new classification schemes. It is associated with shorter computing times compared to our known competitors, and it adopts modern principles of R-package design.