A Communicable Disease Query Engine

Johan Gustav BELLIKAA,1 , Luis MARCOA,1 and Rolf WYNNB

a Norwegian Centre for Integrated Care and Telemedicine, University Hospital of North Norway
b Department of Clinical Medicine, Faculty of Health Sciences, UiT The Arctic University of Norway

Keywords. Self care, self-help resources, clinical decision support systems

Based on daily updated data about communicable diseases in the municipalities of Nordland, Troms and Finnmark counties in Northern Norway, we have implemented a prototype of a disease query engine (DQE), that match symptom sets (the query vector) to diseases (the disease vectors), aimed at helping the general public to find reliable information about likely communicable diseases. The motivation for doing so is to enable an increasing degree of self-help and empower people to have appropriate health service utilization. The disease query engine prototype is available at http://www.erdusyk.no.

The service was constructed based on the following components; a GUI for users to specify their symptoms, a daily updated epidemiology model containing disease probabilities, a DQE, and a user interface for receiving recommendations of relevant self-help pages. The probability of a disease, given a symptom set is estimated using a multi-dimensional symptom vector space to estimate \( P(\text{disease} | \text{symptom-set}) \). This is combined with the novel epidemiology model \( P(\text{disease}) \) for the geographical areas covered by the system. The output of the service is a list of likely diseases sorted by estimated likelihood. This sorted list of diseases is combined with quality assured self-help pages. To validate the accuracy of the recommendations we combine the recommendations with the tentative diagnoses from general practitioners and results from microbiology tests.

We are extracting data to generate the disease probabilities in the epidemiology model from microbiology laboratories covering a population of approximately 470,000, that enables us to provide self-help resources for the population. We are currently collecting data to validate the accuracy of the disease query engine recommendations against tentative diagnoses and laboratory tests provided by the health service. Symptoms information models have been modelled in a multidisciplinary team of clinicians and information architects.

The validation of accuracy of the recommendations is a necessary step towards a potential reduction in health service consumption. The hypothesis is that increased competence among patients will enable appropriate health service consumption. An important part in achieving appropriate health service consumption is the quality of the self-help resources linked to by the service, avoiding situation where unnecessary fear of dangerous diseases generates inappropriate health service consumption.

1 Corresponding Author.