Chapter 36
Enhancing Disability Determination Decision Process Through Natural Language Processing

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ABSTRACT

In this article, a new approach is introduced that makes use of the valuable information that can be extracted from a patient's electronic healthcare records (EHRs). The approach employs natural language processing and biomedical text mining to handle patient's data. The developed approach extracts relevant medical entities and builds relations between symptoms and other clinical signature modifiers. The extracted features are viewed as evaluation features. The approach utilizes such evaluation features to decide whether an applicant could gain disability benefits or not. Evaluations showed that the proposed approach accurately extracts symptoms and other laboratory marks with high F-measures (93.5-95.6%). Also, results showed an excellent deduction in assessments to approve or reject an applicant case to obtain a disability benefit.

INTRODUCTION

Disability programs aim to provide benefits and services to a wide range of people and their families. However, programs such as the United States Social Security Disability Insurance (SSDI), and Supplemental Security Income (SSI) are facing a critical challenge. The rapid growth rate of beneficiaries of disability programs became one of the major economic challenges for most countries. According to the United States Social Security Administration (SSA) 2016 annual report[1], the number of caseloads addressed by SSDI and SSI has grown substantially in recent years.

At the end of 2015, SSDI and SSI programs reported that they granted disability benefits to more than 60 million people. These beneficiaries were classified as 43 million workers in retirement with their dependents, 6 million survivors from crises, and 11 million handicapped workers with their dependents. The total expense in 2015 was $897 billion, while the total revenue was $920 billion.

Also, the rapidly increasing caseloads faced by SSA, coupled with an imbalance in administration, hamper disability determination and make it expensive and time-consuming. This results in a delay in the determination decision and may produce inaccurate results. With the lack of effective tools, applicants' cases, wait for too long a time for processing. This results in issues that negatively impact the trustworthiness of SSA programs. Another factor affecting disability programs consists of the potential policy changes that followed changes in disability programs over the years. For example, policy changes due to national economic conditions can result in extra constraints. Such constraints add more limits to the applicants, reduce the levels of disability benefits, and omit other initiatives taken by SSA. The previous challenges faced by the SSA programs will negatively affect its humanitarian objectives. Further, it will reflect in the adjustment of the SSA services.

Despite great efforts to strengthen the effectiveness of disability determination, processing time is severely long, which causes an enormous backlog. It is shown in (GAO, 2004; David et al., 2015) that there are inconsistencies in the eligibility criteria in different places. Besides, critical decisions used to be taken without being supported by evidence (GAO, 2012; Mann et al., 2014).

The real challenge for SSA is to collect accurate data and use them effectively and efficiently to manage disability programs. However, with the rapidly changing work environments, and increasing numbers of applicants, the pragmatic challenge facing SSA disability programs is: why can't computers make this determination for us? Or, how to automate the whole disability determination process?

Disability programs' managing systems need to evolve to cope with the rapidly changing environment, which calls for a change in the current styles used to gather data. These changes would be necessary to adapt to current challenges and to any future changes in SSA's eligibility protocol. Therefore, disability programs should be improved by speeding up the determination process, as well as the ability to select right candidates who deserve disability benefits and filter out false candidates (Ramampiaro, 2009; Mann et al., 2014).

Due to the increasing health care costs, the quality of care services provided to patients hasn't shown any considerable improvement. Recently, a lot of research demonstrated that healthcare technologies can reduce health care costs dramatically. For this reason, healthcare organizations have adopted the use of electronic health records (EHRs). Contemporary advances in information technology provided simple methods to gather a variety of healthcare data.

Electronic health records (EHRs) are the computerized version of the patient's medical history. They consist of huge, relevant to patient health care like demographics, physician's observations, and clinical laboratory data. EHRs may contain other information that describes observations about patients' care viewpoints or deductions. An important feature of EHRs is that they provide effective and efficient sharing methods to health care providers and organizations. These methods enable organizations to share information with one another in real time. Also, it enables authorized users to access and manipulate their data effectively. In this context, electronic health record can streamline and speed up the workflow by providing direct access to any updates to any records, in real time Kemkarl et al. (2012). EHRs can support other health care activities such as evidence-based decision support systems. Storage and retrieval of medical records become more efficient with the use of EHRs, which support and improve the

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