

# Health Risk Analysis Expert System for Family Caregiver of Person with Disabilities using Data Mining Techniques

Ureerat Suksawatchon<sup>1</sup>, Jakkarin Suksawatchon<sup>2</sup>, and Wannarat Lawang<sup>3</sup>

## ABSTRACT

The nursing care for the family caregiver of the disabled person is an important task for long-term care, since the caring people with disabilities is the difficult and hard task. In this paper, the Health Risk Analysis System or *HRAS* is introduced which is the new expert system for identifying the health risk level in three aspects including mental, physical, and social health aspects, and provides the intervention according to the health risk level of each aspect as well. The *HRAS* is the client-server system. The *HRAS* client proceeds on web-based application to collect health data via online questionnaire and shows the analysis results. The collected health data are transmitted to the server to analysis and to assess the health risk level by using the proposed classifier model named Risk Analysis Classifier or *RAC*. The classification algorithm and rule-based classifier are used to build the *RAC*. The *RAC* is evaluated using k-fold cross validation and the experts with annotated health data and unseen data. The evaluation results showed that Neural Network performs the best performance overall which it achieves the accuracy above 90% in all health data sets. Thus, the Neural Network is the most suitable classifier for this work. In addition, the *HRAS* has been deployed and collected the user experience via the formal survey. These survey results demonstrated that the system provides high accuracy assessment and very utilization in several aspects.

**Keywords:** health care system, caregiver, classifications

## 1. INTRODUCTION

There is an increase in adults with a physical disability in developing countries like Thailand. The adults with a physical disability need to find someone to care for them and to support them at home, because paid personal care attendants are one option but it is expensive. In other word, family members

become an essential support as “family caregivers”. Over 95% of all Thai people with disabilities receive care at home and the majority of caregivers are family members. Therefore, their care is solely dependent on family caregivers whose substantial commitment to long-term care can impact significantly on their health [1]. The caregiver caring is also important for long-term care. Because the caring for a person with disabilities is difficult and hard tasks to provide home care services every day [2]. The effect is that most family caregivers suffer health problems and require support from the people around them.

The research [3] studied the impact of sleep interruptions of the female caregiver and the research [4] studied the impact of caring for a person who has experienced stroke. These researchers found that most family caregivers experienced health problems because of lack of exercise including lack of annual health examination and having sleep trouble. These abusive behaviors required support from the people around them. Especially, caregivers were more inappropriately behave and had health problems than those who did not serve as caregivers of the disabled people. Moreover, the perceived health status was lower than that of the normal population. There are several factors affect the low perception of health status among caregivers in Thailand, including female caregivers to care the mother of the husband, older, low level of education, insufficient income, having a health problem, lack of caring experience, having other roles [5]. Therefore, the assessment of the health risks of the family caregiver is essential. Because the assessment of the factors can indicate the risks of family caregivers in case of health problems and can lead to activities for supporting healthcare [2].

In addition, our team interviewed the expert who has studied in the family care domain since 2013. Our finding from the interview found that typically, the health risk assessment of each caregiver is collected and analyzed by nurses who work in such area and are close to the family caregiver. Each assessment is performed by using the specified questionnaire composed of 6 parts and 143 topics. Therefore, quantitative and quality data are collected concurrently involving a face-to-face interview with family caregivers which spend times to collect the information in approximately 30-45 minutes per person. Besides,

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<sup>1,2</sup> The authors are with Faculty of Informatics, Burapha University, Chonburi, Thailand., E-mail: ureerat@go.buu.ac.th and jakkarin@go.buu.ac.th

<sup>3</sup> The author is with Faculty of Nursing, Burapha University, Chonburi, Thailand., E-mail: lawang@go.buu.ac.th