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Study on Prediction of Activities of Daily Living of the Aged People Based on Longitudinal Data

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Abstract

The loss of Activities of Daily Living (ADL) is the most important health problem of the elderly, which is related to their quality of life and the nursing burden of family. Based on the survey data of China's elderly health impact factors (2002 ~ 2011), the C5.0 method of decision tree was used to establish the prediction model of ADL. The variables of our model include demographic variables, personal habits, social activities, disease, mental state, and the current state of ADL. The experimental results show that: (1) The model can predict the ADL condition of the elderly people in the next 2~3 years, and C5.0 has a higher accuracy than other methods; (2) The age is the most important factor, followed by the current ADL status; in addition whether to do house work frequently and residential area both have important influence on ADL status; (3) Doing housework, taking part in social activities and keeping good mental state are helpful to keep healthy.

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1. Introduction

China has become a country with the largest quantity of the old-aged people. According to the data from the National Statistics Office, in China 60 years old people accounted for 15.5% of the total population in 2014. With the aging of the population, the number of the disabled elderly is increasing. According to the data released by the China Aging Science Research Center, the disabled elderly population exceeded 40 million in 2015. The issues of activities of daily living and long-term care of the aged people have aroused more and more attention in our country.

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Disability refers to the state of losing ability of daily life when the elderly people have been suffering from chronic diseases, physical injury, or psychological imbalance. The Activities of Daily Living (ADL) is one of the most common indicators to evaluate the health status of the elderly. ADL was proposed by Katz in 1963, which is to measure the number of limitations on activities of daily living. There are six ADL limitations in total, which consist of difficulties with: bathing, eating, grooming, dressing, getting up from a bed and using the toilet [1]. The elders who need help from other people or appliances in these basic daily activities will be treated as disabled. Disability will not only lead to a sharp deterioration in the living conditions of the elderly, but also increase the burden of care. Therefore, it has important practical significance to find out the influencing factors of the loss of activities of daily living of the elderly, and then to predict the disability in the future. Furthermore, some appropriate intervention services can be used, in order to delay or avoid the occurrence of the disabled.

In the study of activities of daily living of the elderly, many scholars have analysed the influencing factors. Diehl believes that social and cultural factors and individual factors both affect the elderly people's daily living skills [2]. Individual factors mainly relate to the natural attributes, social economic attributes, behavioural characteristics (way of life) and chronic diseases and so on [3]. Demura et al showed that there are significant differences on disability status between different genders of the elderly [4]. A healthy lifestyle is closely related to the ADL status of the elderly [5], while the lifestyle which is resulting in negative effects includes diet of high salt and high fat, smoking, drinking, mental strain and lack of physical exercise [6]. Kaplan's study found that chronic disease is the most important factor affecting the ADL of elderly [7]. Diehl's research shows that the factors of living environment include family, neighbourhood, community, policy, customs, fashion and other social and cultural factors have a certain influence on ADL [2].

There are also some related researches in china. Based on survey data of Chinese aged people, Gu et al found that age, urban and rural, gender, educational level and marital status are main influencing factors for the changes of activities of daily living of Chinese elderly in the ten years from 1992 to 2002 [8]. By using the data of Chinese longitudinal healthy longevity survey, Yin et al. analysed the influencing factors of ADL of the Chinese oldest-old. Among the individual factors, age and chronic disease, cognitive ability, visual condition, emotion, living arrangements, doing manual labour before are important. The regional factors are arranged according to their importance as: natural environment, medical condition, the staple food structure, and poverty situation [9, 10]. Jiao investigated the relationship between activities of daily living and the risk of death, and found that the relationship is weakened with age, and there are differences between different genders [11]. Jiang et al. analysed the influencing factors of self-rating health status and ADL of the elderly, and found that age, place of residence, spouse, living arrangement, smoking, drinking, taking part in physical exercise, participating in social activities, suffering from serious illness in the past two years, negative emotions, and a living mother have significant effects on ADL of the elderly [12]. Jing et al. studied on the old people in Shandong province, and showed that gender, education levels, sports activities and all kinds of chronic diseases are the risk factors for the decline of ADL [13]. By investigating on the elderly people over 80 years old in the city of Hangzhou, Chen et al. found that there is a higher proportion of damage for ADL of the oldest-old. The risk factors of ADL include not living together with the spouse, unhealthy mental conditions, and suffering from the chronic non-communicable diseases, and while the protective factors include regular exercises, and doing housework [14]. By investigating on the elderly from different areas, some researchers have made similar conclusions that age, gender, region, marital status, economic conditions, education level, with diseases of the circulatory system important factors for ADL of the elderly [15-17].

In addition, the ADL of the elderly changed over time. Therefore, the longitudinal survey data of the same object is more helpful to study the changes of the elderly's disability status. However, most of the researches are based on cross-sectional data, and there is only a few researches using longitudinal survey data which mainly focused on health status transition. For example, Manton used NLTCs (America's long-term care survey) longitudinal data to study the state transition probability of old people in a period of time [18]. James Robinson

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