運用基因演算法建構疾病預測模型之研究-以睡眠呼吸中止症候群爲例

The Use Genetic Algorithm to Predict Disease-A Case Study of Sleep Apnea Syndrome.

中文摘要

睡眠呼吸中止症候群被認爲是二十世紀所發現最重要的睡眠障礙，也是睡眠醫學重要的研究方向，患者因睡眠呼吸中止造成睡眠期間反覆缺氧的結果而容易導致心肺功能受損、白天嗜睡、疲勞駕駛等併發症與後遺症，嚴重者甚至造成睡眠中猝死，不但耗費醫療資源，也將嚴重影響患者生活品質。一般來說患者並無立即病痛與不適且大多患者都不自覺，容易造成延誤就醫且睡眠多項生理檢查需耗費相當昂貴的成本與人力，目前國內的醫療資源並無法做全面性的篩選，就預防醫學的角度而言，建立一套可以優先準確篩選出中度與重度睡眠呼吸中止症候群的預測模型有其必要性。

本研究將以病患就醫過程中產生的相關問卷資料爲基礎，再運用基因演算法來解決複雜的問卷變項問題，建立一套可以準確預測出中度與重度睡眠呼吸中止症候群診斷系統，提供高危險群簡便、準確的預測模型，讓醫療人員及早針對不同嚴重程度的患者提供適當的治療與建議，預防其併發症與後遺症的發生，進而達到預防性醫學的目標。從研究成果顯示，運用基因演算法模型明顯優於普遍被流行病學者用來建立疾病預測模型的 Logistic Regression 方法，其診斷預測績效也更爲優異與準確。

英文摘要

Sleep apnea syndrome is regarded as the most important sleep disorder discovered in the 20th century as well as the significant research direction for sleep medicine. Sleeping breath-ceasing results in a symptom of repeated arterial anoxemia in sleeping, which can easily cause harm to cardio-pulmonary and causes sequela and complicating disease such as excessive day-time sleepiness and drowsy driving, even sudden death in sleeping. In such situations, the disease not only consume a lot of medical resources but also has a bad impact on the patient' living quality. Generally speaking, most of patients are unaware of sleep apnea syndrome for its painlessness and none-discomfort, which will delay treatment. Moreover, it requires for high costs and personnel expense on polysomnograph (PSG) examination. We could not do overall examination according to the contemporary medical resources.

In the aspect of preventive medicine, it is necessary to establish a set of prediction model to accurately give preference to moderate serious sleep apnea syndrome.

In this study, by means of computerized analyzing the laboratory data of the patients during medical visits we use Genetic Algorithms (GA) to solve complicated problems from changeable items of questionnaire to establish a system that can accurately predict moderate serious sleep apnea syndrome. The system can provide high-risk populations with convenient and precise predictive model so as to help medical personnel that they could propose the proper treatments and suggestions for patients according to various degrees of disease. The result of the research clearly shows that GA model is better than Logistic Regression that is widely used for establishing Disease Predictive model by scholars of epidemic diseases, and it brings more accurate effects than that of the later.