Intelligent Health Vessel ABC –DE An Electrocardiogram Cloud Computing Service

MICANS INFOTECH

Abstract

- The severe challenges of the fast aging population and the prevalence of cardiovascular diseases highlight the needs for effective solutions supporting more accurate and affordable medical diagnosis and treatment. Recent advances in cloud computing have inspired numerous designs of cloud-based health care services.

- In this paper, we developed a cloud-computing platform monitored by physicians, which can receive 12 –lead ECG records and send back diagnostic reports to users.

- Aiming to lessen the physicians' workload, we implemented an analysis algorithm that can identify abnormal heart rate, irregular heartbeat, abnormal amplitude, atrial fibrillation and abnormal ECG in it.

- A large number of testing samples were used to evaluate performance. Our algorithm achieved a TPR95 (specificity under the condition of negative predictive value being equal to 95%) of 68.5% and 0.9317 AUC (area under the ROC curve) for classification of normal and abnormal ECG records and a sensitivity of 98.51% and specificity of 98.26% for atrial fibrillation classification, comparable to the state-of-the-art results for each subject.

- The proposed ECG cloud computing service has been applied in Hunan Jinshengda Aerial Hospital Network and it now can receive and analyze ECG records in real time.

Existing

- Cardiovascular disease is the leading cause of death for Chinese in both urban and rural areas. More than 290 million are currently diagnosed, and the prevalence of cardiovascular disease is continuously increasing and will remain an upward trend in the next 10 years.

- A very common type of cardiovascular disease is cardiac disease believed to be responsible for most of the sudden cardiac deaths.

- In clinical practice, the most frequently used test for a cardiac disease is through analyzing the electrocardiography (ECG), which measures the electrical impulses of the heart via electrodes on the skin.

- Due to several technological advances, such as wearable medical devices, Body Area Networks and pervasive wireless broad-band communications, it is easy to perform remote real-time collection and dissemination of ECG data now

Proposed

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HARDWARE REQUIREMENTS

- Processor   –   Pentium –III
- Speed   –   1.1 Ghz
- RAM   –   256 MB(min)
- Hard Disk   –   20 GB
- Floppy Drive   –   1.44 MB
- Key Board   –   Standard Windows
  Keyboard
- Mouse   –   Two or Three Button
  Mouse
- Monitor   –   SVGA

SOFTWARE REQUIREMENTS

- Operating System   :   Windows 8
- Front End   :   Java /DOTNET
- Database   :   Mysql/HEIDISQL

Conclusion

- Cardiovascular diseases are the world's number one cause of death and the great majority of cardiovascular deaths occur in developing countries.

- In China, a large number of people that live in the rural areas do not have regular access to high quality primary care.

- With the development of telemedicine and portable devices, it is now feasible to provide solutions to improve the quality of health care for those people.

- Patients' vital signs and other physiological signals play significant roles to diagnose cardiovascular diseases. Among them, the ECG is a simple but effective diagnostic tool.

Reference

[1] W. Wang, S.S. Hu, L.Z. Kong, et al, "Summary of report on cardiovascu-lar diseases in China 2012," Biomed. Environ. SCI., vol.27, no.7, pp.552–558, July. 2014.

[2] G. Fortino, G.D Fatta, M. Pathan, et al, "Cloud- assisted body area net-works: state- of- the- art and future challenges.Wireless Networks," Wirel. Netw., vol.20, no.7, pp.1925– 1938, Oct. 2014.

[3] S. Pandeya, W. Voorsluys, S. Niua, et al, "An autonomic cloud envi-ronment for hosting ECG data analysis services," Future Gener. Comp. Sy., vol.28, no.1, pp.147– 154, Jan. 2012.

[4] H. N. Xia, I. Asif and X. P. Zhao, "Cloud- ECG for real time ECG moni-toring and analysis," Comput. Methods Programs Biomed., vol.110, no.3, pp.253– 259, Jun. 2013.

[5] J. C. Hsieh and M. W. Hsu, "A cloud computing based 12- lead ECG telemedicine service," BMC Med . Inform. Decis. Mak., vol.12, no.1, pp.77, Dec. 2012