



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Special Issue 2, April 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com

A Web-Based Consultation Portal with DNA Sequence Matching using Needleman-Wunsch Algorithm

Dr. M Usha¹, Keerthana C², Mahalakshmi V³

Associate Professor, Department of Computer Science Engineering, Velammal Engineering College, Chennai, Tamil Nadu, India¹

U.G. Student, Department of Computer Science Engineering, Velammal Engineering College, Chennai, Tamil Nadu, India²

U.G. Student, Department of Computer Science Engineering, Velammal Engineering College, Chennai, Tamil Nadu, India³

ABSTRACT: This paper proposes a web-based consultation portal which aims to provide users with a convenient and efficient way to receive medical advice and prescriptions. Through the web-based interface, users can consult with licensed physicians and specialists and receive personalized treatment recommendations. The added feature of DNA sequence matching using the Needleman-Wunsch algorithm is an innovative approach that can significantly enhance the accuracy of research recommendations. The Needleman-Wunsch algorithm is a widely used algorithm in bioinformatics that compares two DNA sequences and finds the optimal alignment. By comparing a patient's DNA sequence with reference sequences, physicians can determine the most matching probability and identify any genetic variations. Thus, the proposed web-based consultation portal with DNA sequence matching is an innovative approach that can significantly improve the digital well-being of healthcare industry.

KEYWORDS: Healthcare Providers, Consultation, DNA Sequence matching, Web-portal, Needleman-Wunsch Algorithm.

I. INTRODUCTION

With the increased attention of using of online e-Health portals in various countries across the world, it has become highly challenging to find one such online system or portal that “fits all.” In fact, this is one of the reasons why we set out to create one that could “fit” the needs of a specific population group. The overall adoption of e-Health portals when implemented successfully has been significant. There is an increased interest in the adoption of e-healthcare solutions and the fundamental change on how patient records, service provider communications, and appointment scheduling can be changed and delivered according to user’s convenience. The unique feature that isn’t currently available in other portal is DNA pattern matching which can be utilized by only doctors and healthcare providers for research and also other purposes.

This paper is organized as follows. Section II describes the related works of the web-portals based on Healthcare and also the sequence matching of the DNA. The data flow diagram represents the flow of the web portal and also the working of the Needleman-Wunsch algorithm that is given in Section III. Section IV presents experimental results showing results of images tested. Finally, Section V presents conclusion.

II. RELATED WORK

[1] Personal health record (PHR) is an emerging patient-centric model of health information exchange, which is often outsourced to be stored at a third party, such as cloud providers. In the above-mentioned paper, the authors propose a novel patient-centric framework and a suite of mechanisms for data access control to PHRs stored in semi trusted servers. [2] A study on E-Health Monitoring Systems that had been published in the IEEE Journal of Biomedical and

Health Informatics was examined. It integrates the wireless technologies and information platform to improve the quality of healthcare industry.[3] *MyHealthPortal* – a patient portal aimed at non-primary care, in-homecare, and/or special healthcare for patients. *MyHealthPortal* can assist homecare and clinic-based healthcare services along with the benefits of existing portals and developed has more secure and robust one.[4] B. NEEDLEMAN and CHRISTIAN D. WIJNCH developed a general method for searching for similarities in the amino acid sequences of two proteins. A computer-adaptable approach for detecting similarities between two proteins' amino acid sequences. This data is utilised to track their likely evolutionary progression.

Motivated by the above limitations of existing patient care portals, we developed a new web-based consultation portal, for homecare patients. Our portal also provides clinic-based healthcare services such as online appointment booking, monitoring, information sharing and DNA pattern matching by doctors for research purpose. We set out to design and implement a unique web portal that works in unison with the operations of Closing the Gap's in EHR system.

III. METHODOLOGY

The web-based consultation portal presented in this paper will serve as a conduit for consultation between healthcare professionals and users based on their needs. It is made up of three modules: User, Healthcare Provider, and Admin, which cover the most important aspects of this consultation portal healthcare system. The system can capture important data and make it available to clinicians. Physicians can act on them by suggesting or changing the therapy, for example. Added DNA Sequence Matching feature for healthcare practitioners to match the DNA Sequence with the Needleman-Wunsch Algorithm was developed using JAVA and integrated into the web-portal. The loaded dataset and the entry from healthcare professionals are matched.

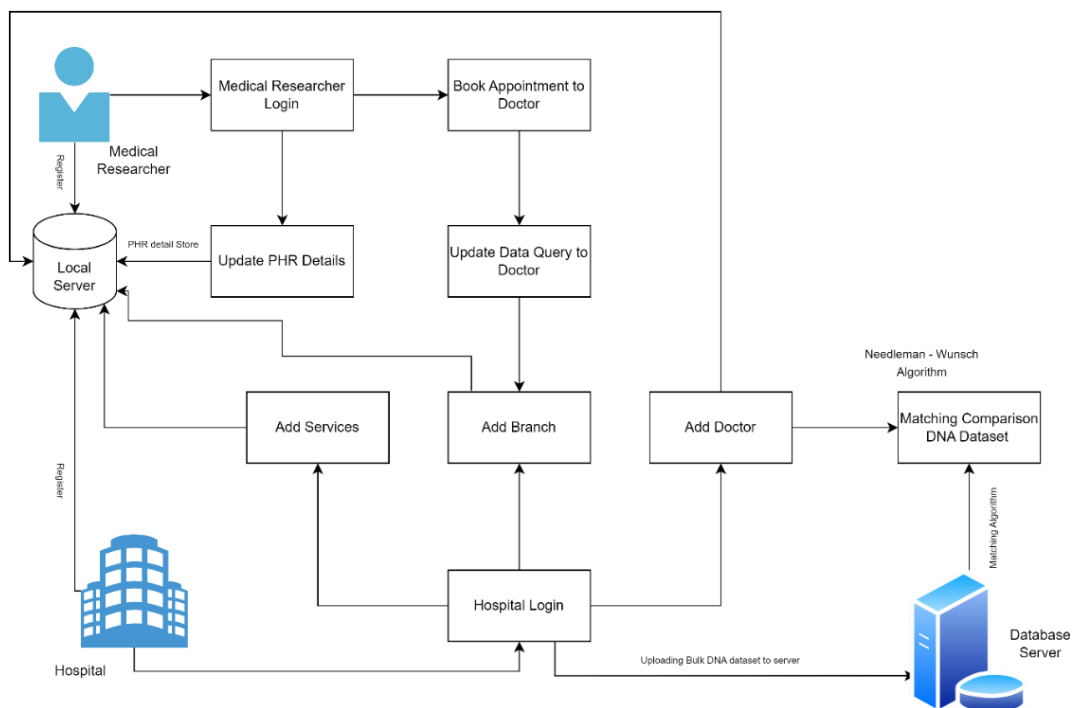


fig. 1 Health Care Provider - Block Diagram

IV. EXPERIMENTAL RESULTS

The result is presented as a web-based portal meant to automate the processing of healthcare industry. The application is successfully developed, tested, and found to be working as expected. The Healthcare Consultation System was developed using HTML, CSS and JavaScript. The look is as *fig (2a) – fig (3f)*.

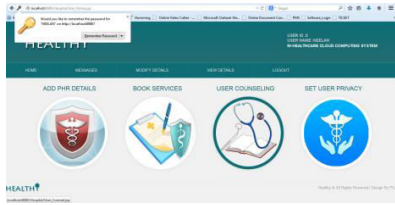


fig 2 (a) User Home Page



fig 2 (b) Add New Doctors Page

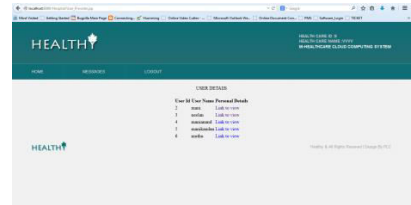


fig 2 (c) View User's Details

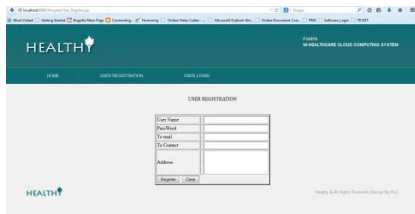


fig 2 (d) User Registration page

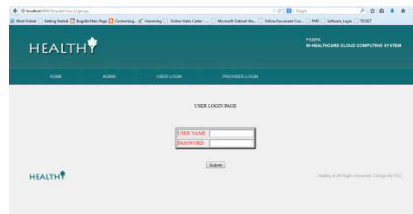


fig 2 (e) User Login Page

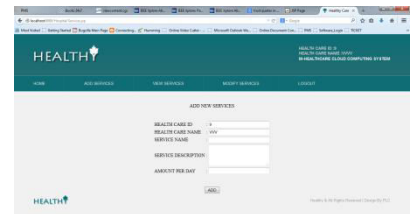


fig 2 (f) Add new services

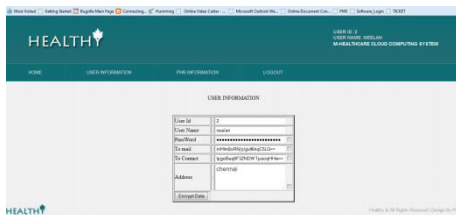


fig 3 (a) Set Privacy for User information

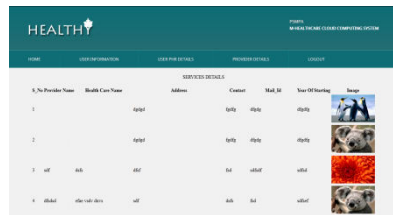


fig 3 (b) Overall Services View

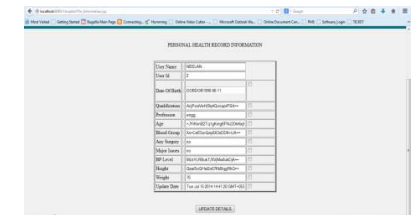


fig 3 (c) Set PHR Details Privacy



fig 3 (d) DNA Matching pattern test



fig 3 (e) DNA Unmatching pattern test

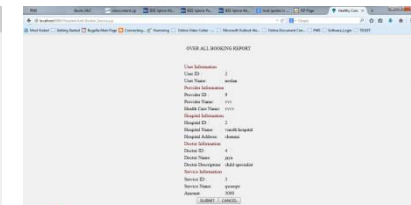


fig 3 (f) Overall Booking Report

V. CONCLUSION

In this paper, a healthcare web portal can greatly enhance the delivery of healthcare services to patients by providing them with access to medical information, online appointment booking, medication management, and communication with healthcare providers. It can also streamline administrative tasks and improve the efficiency of healthcare organizations. However, the development and implementation of a healthcare web portal must be done with careful consideration of privacy and security measures to protect patient information. We focused on creating a clean and intuitive design that would be easy for patients to navigate. We decided to use a robust database management system to store patient information securely. Additionally, we have a feature for DNA sequence matching which is used by Health Providers for their research and other purposes.

REFERENCES

[1] Tanbeer SK, Sykes ER. MyHealthPortal – A web-based e-Healthcare web portal for out-of-hospital patient care. DIGITAL HEALTH. 2021;7. doi:10.1177/2055207621989194
 [2] Mohammad Isa Irawan et al 2019 J. Phys.: Conf. Ser. 1218 012031, “Application of Needleman-Wunch Algorithm to identify mutation in DNA sequences of Corona virus”.

- [3] Muhamad, F. & Ahmad, R. Badlishah & Asi, Salina & Murad, Muhamad Nasir. (2018). "Performance Analysis Of Needleman-Wunsch Algorithm (Global) And Smith-Waterman Algorithm (Local) In Reducing Search Space And Time For Dna Sequence Alignment". *Journal of Physics: Conference Series*. 1019. 012085. 10.1088/1742-6596/1019/1/012085.
- [4] Nacong, N., Lusiyanti, D, Irawan, M.I, (2018) Sequence analysis of Leukemia DNA, *AIP Conference Proceedings* 1937, 020010; (<https://doi.org/10.1063/1.5026082>)
- [5] Center of Diseases Control. Middle East Respiratory Syndrome (MERS). URL <<http://www.cdc.gov/coronavirus/mers/faq.html>> diakses pada 28 January 2018
- [6] Z. Hu, J. Jian, Y. Hua, D. Yang, Y. Gao, J. You, Z. Wang, Y. Chang, K. Yuan, Z. Bao, Q. Zhang, S. Li, Z. Jiang, and H. Zhou, "DNA colorimetric logic gate in microfluidic chip based on unmodified gold nanoparticles and molecular recognition," *Sens. Actuators B, Chem.*, vol. 273, pp. 559–565, Nov. 2018, doi: 10.1016/j.snb.2018.06.073.
- [7] R. Peng, X. Zheng, Y. Lyu, L. Xu, X. Zhang, G. Ke, Q. Liu, C. You, S. Huan, and W. Tan, "Engineering a 3D DNA-logic gate nanomachine for bispecific recognition and computing on target cell surfaces," *J. Amer. Chem. Soc.*, vol. 140, no. 31, pp. 9793–9796, Jul. 2018, doi: 10.1021/jacs.8b04319.
- [8] X. Liu, F. Zhang, X. Jing, M. Pan, P. Liu, W. Li, B. Zhu, J. Li, H. Chen, L. Wang, J. Lin, Y. Liu, D. Zhao, H. Yan, and C. Fan, "Complex silica composite nanomaterials templated with DNA origami," *Nature*, vol. 559, no. 7715, pp. 593–598, Jul. 2018, doi: 10.1038/s41586-018-0332-7.
- [9] A. J. Thubagere, W. Li, R. F. Johnson, Z. Chen, S. Doroudi, Y. L. Lee, G. Izatt, S. Wittman, N. Srinivas, D. Woods, E. Winfree, and L. Qian, "A cargo-sorting DNA robot," *Science*, vol. 357, no. 6356, Sep. 2017, Art. no. eaan6558, doi: 10.1126/science.aan6558.
- [10] Naidu V. and Narayanan A. 2016, "Needleman-Wunsch And Smith-Waterman Algorithms For Identifying Viral Polymorphic Malware Variants". (IEEE 14th Intl Conf on Dependable, Autonomic and Secure Computing)
- [11] Y. Amir, E. Ben-Ishay, D. Levner, S. Ittah, A. Abu-Horowitz, and I. Bachelet, "Universal computing by DNA origami robots in a living ani-mal," *Nature Nanotechnol.*, vol. 9, no. 5, pp. 353–357, Apr. 2014, doi: 10.1038/NNANO.2014.58.
- [12] Q. Zhang and X. Wei, "A novel couple images encryption algorithm based on DNA subsequence operation and chaotic system," *Optik*, vol. 124, no. 23, pp. 6276–6281, Dec. 2013, doi: 10.1016/j.ijleo.2013.05.009.
- [13] Y.-J. Chen, N. Dalchau, N. Srinivas, A. Phillips, L. Cardelli, D. Soloveichik, and G. Seelig, "Programmable chemical controllers made from DNA," *Nature Nanotechnol.*, vol. 8, no. 10, pp. 755–762, Sep. 2013, doi: 10.1038/nnano.2013.189.



SJIF: 8.423



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INTERNATIONAL CENTRE



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details