GRAPHICAL USER INTERFACE FOR STATISTICAL CHARACTERISTICS OF SKULL MORPHOLOGY IN SYNDROMIC CRANIOSYNOSTOSIS

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Product Background

- Circular data, such as skull angle can be found in biomedical area. Biomedical data are often complex in structure and exposed to an abnormality.
- In this study, we consider a case study related to a congenital disorder called craniosynostosis syndrome which results in skull growth abnormalities.
- In this study, 12 skull angles of craniosynostosis patients age of 0-12 years old in Malaysia are analysed using circular statistics methods. The raw CTSCAN data is provided by UM Specialist Centre.
- The statistical characteristics of skull morphology in syndromic craniosynostosis are displayed and compared with the normal skull data of Malaysian children age 0-12 years old.
- A Graphical User Interface (GUI) is developed using Python to give user a specific statistical analysis about the skull morphology characteristics of craniosynostosis syndrome patients in Malaysia.

The Craniosynostosis Syndrome
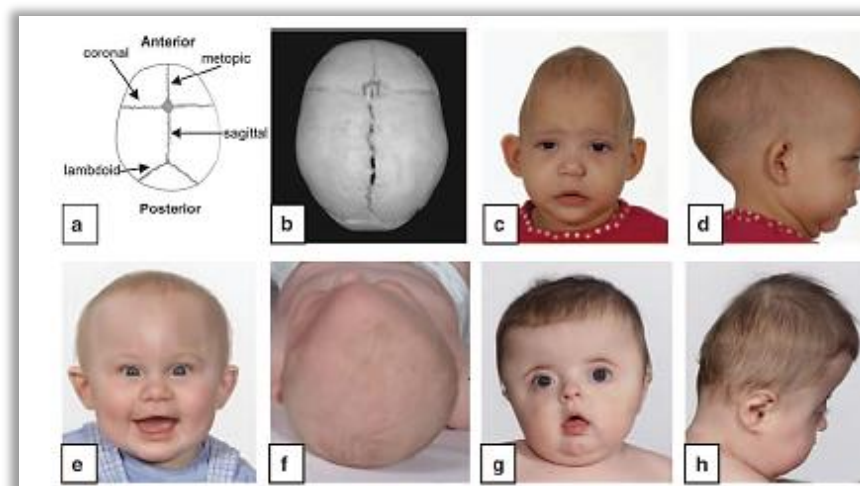
Craniosynostosis syndromes are development disorders that effect the shape of skull which cause an abnormal shape due to premature fusion of cranial sutures. In Malaysia, there exist three genetic syndromes related with craniosynostosis which are Apert syndrome, Crouzon syndrome and Pfeiffer syndrome.

Novelty/ Originality/ Inventiveness

- The GUI analysis includes the descriptive and graphical summaries of normal and abnormal skull data angles.
- Early detection of the syndrome is helpful to the clinician for treatment planning.
- The novelty of this research is the formulation of statistical procedure to determine abnormality in circular biomedical data, especially for syndromic craniosynostosis.

Marketability & Commercialisation

- The data used in this study covered the population data of syndromic craniosynostosis syndrome patients in Malaysia since all patients with the syndrome in Malaysia are treated at UM Specialist Centre.
- The GUI analysis can be used by other local and global hospital too.
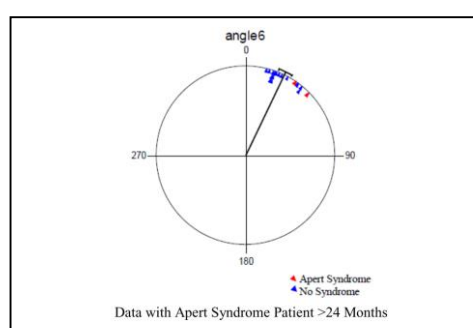
Status of Innovation

- The prototype (GUI) is ready.
- Addititional feature which is the outliers detection procedures to detect the abnormalities using more advanced techniques such as clustering algorithm is currenty under development.

Benefits/Usefulness/ Applicability

- For the healthcare segment, the GUI will benefit a lot in medical diagnosis process to provide better treatment planning of craniosynostosis syndrome patients in Malaysia.

Publications

- Zulkipli, N. S., Satari, S. Z., & Yusoff, W. N. S. W. (2020). Descriptive analysis of circular data with outliers using Python programming language. *Data Analytics and Applied Mathematics (DAAM)*, *01*(01), 31–36.
- Zulkipli, N. S., Satari, S. Z., & Yusoff, W. N. S. W. (2021). A synthetic data generation procedure for univariate circular data with various outliers scenarios using Python programming language. Submit to SKSM28.