Northern Australian Regional Digital Health Collaborative

Seed Funded Project

Osteoarthritis triaging tool: Cutting wait times and enhancing patient outcomes

Osteoarthritis (OA) is a prevalent and growing issue exacerbated by an aging population and rising obesity rates, with 1 in 3 Australians classified as obese (1). Knee arthritis, the most common form of arthritis, affects approximately 4% of the global population, causing joint pain and stiffness (2).

Management varies from conservative treatments to surgical interventions, with significant delays in public system orthopaedic clinics, exacerbated by the COVID-19 pandemic backlog. This project aimed to develop an AI-based application to detect and assess the severity of knee OA from radiographs, streamlining the triage and management process for patients.

The approach involved developing deep learning models using annotated datasets to classify X-rays according to OA presence and severity.

Convolutional Neural Networks (CNNs) were trained and validated on these datasets, ensuring accuracy through performance metrics like precision and recall.

The project included a validation phase with real patients at Alice Springs Hospital, comparing AI model outputs with manual assessments.

The AI tool accurately predicted knee OA severity from X-rays and received positive feedback from users in terms of ease of use. The biggest challenge in the project was how to integrate this into standard outpatient procedures.

Project leads: Jonathan Ryan and Maxine Rickman

Key Messages

The project aimed to develop an AI-based application to detect and assess knee osteoarthritis (OA) severity from radiographs, addressing delays in public orthopaedic clinics worsened by the COVID-19 backlog.

Deep learning models using Convolutional Neural Networks (CNNs) were trained on annotated X-ray datasets to classify OA presence and severity. The AI tool was validated at Alice Springs Hospital, showing accurate predictions and positive user feedback.

While the AI tool demonstrated effectiveness and ease of use, integrating it into standard outpatient procedures posed the biggest challenge.

References

1. Australian Institute of Health and Welfare. (2024). Overweight and obesity. Retrieved from https://www.aihw.gov.au/reports/overweight-obesity/overweight-and-obesity

2. Long, H., Liu, Q., Yin, H., Wang, K., Diao, N., Zhang, Y., Lin, J., & Guo, A. (2022). Prevalence trends of site-specific osteoarthritis from 1990 to 2019: Findings from the global burden of disease study 2019. Arthritis & Rheumatology, 74(7), 1172– 1183. https://doi.org/10.1002/art.42089

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