Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

OUT OF THE PRESS
Our publications - September

Peer-reviewed Journal Articles

P2OP—Plant Pathology on Palms: A deep learning-based mobile solution for in-field plant disease detection

Sivasubramaniam Janarthan, Selvarajah Thuseethan, Sutharshan Rajasegarar, John Yearwood

Abstract

Plant diseases are one of the dominant factors that threaten sustainable agriculture, leading to economic losses. Developing an accurate mobile-based plant disease detection methodology is important for enabling rapid identification of emerging diseases directly from the farms. The deep learning methods have limited usage in mobile-based applications as they require larger memory and processing power to operate directly on smartphones or internet connectivity when used with a client–server computing model. To address this challenge, we propose a mobile-based lightweight deep learning-based model, which requires only a small footprint and processing power while maintaining higher detection accuracy. With around 0.088 billion multiply–accumulation operations, 0.26 million parameters, and 1 MB storage space, this framework achieved 97%, 97.1% and 96.4% accuracies on apple, citrus and tomato leaves datasets, respectively. One of our tiny models achieved 93.33% accuracy on a custom sourced in-the-wild apple leaves images dataset, which affirms the in-field applicability of the proposed framework. The superiority of the proposed model is further demonstrated through a comparative study with equivalent lightweight models.

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Single-channel characterization of the chitooligosaccharide transporter chitoporin (*Sm*ChiP) from the opportunistic pathogen *Serratia marcescens*

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ABSTRACT

Serratia marcescens is an opportunistic pathogen that can utilize chitin as a carbon source, through its ability to produce chitin-degrading enzymes to digest chitin and membrane transporters to transport the degradation products (chitooligosaccharides) into the cells. Further characterization of these proteins is important to understand details of chitin metabolism. Here, we investigate the properties and function of the *Serratia marcescens* chitoporin, namely *Sm*ChiP, a chitooligosaccharide transporter. We show that *Sm*ChiP is a monomeric porin that forms a stable channel in artificial phospholipid membranes, with an average single-channel conductance of 0.5 ± 0.02 nS in 1M KCl electrolyte. Additionally, we demonstrated that *Sm*ChiP allowed the passage of small molecules with a size exclusion limit of <300 Da, and exhibited substrate specificity towards chitooligosaccharides, both in membrane and detergent-solubilized forms. We found that *Sm*ChiP interacted strongly with chitopentaose (K_d = 23 ± 2.0 μM) and chitohexaose (K_d =17 ± 0.6 μM) but did not recognize non-chitose oligosaccharides (maltohexaose and cellohexaose). Given that *S. marcescens* can use chitin as a primary energy source, SmChiP may serve as a target for further development of nutrient-based antimicrobial therapies directed against multidrug antibiotic-resistant *S. marcescens* infections.

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Conference Proceedings

Feasibility of Distance-Monitoring Intervention on Sedentary Time and Physical Activity among Sri Lankan Adolescents

SA Wickramarachchi , TFT Kamalden, and SK Geok

Abstract

COVID-19 restrictions such as the closure of schools and parks, and the cancellation of youth sports and activity classes around the Sri Lanka may prevent children from achieving recommended levels of physical activity (PA). The prime aim of this study was to examined the feasibility of distance-monitoring concept on sedentary time (ST) and PA of Sri Lankan adolescents. Study was conducted by using concurrent triangulation design under the mix method research approach. Data were obtained from 347 male and female adolescents aged between 13-17 by using multi stage sampling technique. Data were obtained from WHO STEPS instrument for PA and Adolescent Sedentary Activity Questionnaire (ASAQ) for ST. Parents also reported children BSP through Children's Sleep Habits Questionnaire (CSHQ). At follow-up, the overall retention of participants was 347 (82.6%) and treatment fidelity rate was 87.5%. The study found that PA level of the respondents increased significantly from 784.7 MET/min per week to 831.7 MET/min per week ($p<0.05$). The ST also decreased significantly from 3490 min/per week to 3332 min/per week ($p<0.05$). The study also showed that 66% of adolescents adhered to the recommended guidelines using distance monitoring. According to the thematic analysis students and teachers' perception on this was an even chance to accept this and parents seems to thinks its impractical and it's a quite challenge to implement. Distance monitoring has potentials in regulating and decreasing SB among adolescents in Sri Lanka and its feasible.

About the Conference

15th International Research Conference

29th - 30th September 2022

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