AI-enabled proactive mHealth

with automated decision-making

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Introduction

Traditionally healthcare is based on a reactive approach which is to react when symptoms appear i.e., take action when the crisis occurs [1]. It is convenient in most health-related concerns but depreciates self-management or self-empowerment to promote wellbeing. Proactive health conversely can predict and prevent a situation beforehand. It does not out-roll the reactive approach but complements it. Allowing supportive actions before a crisis [2] enables care that empowers the user to promote wellbeing. Mobile health (mHealth) can be pivotal for proactive health. mHealth combines wearables to render health services on the fly [3]. mHealth empowers the user by providing new insights on the health information gathered with wearables and mobile devices. With the collected data from users carrying these devices at all times, it is vital to understand the need for user-level decision-making. To achieve proactive health with the capability of prediction and prevention, AI can contribute by applying reasoning and negotiation to the available health data and recognizing patterns which can be used to automate processes and augment healthier practices.

The Framework

The main contribution of the research presented in this poster is to establish a core framework of proactive mHealth It includes machine learning algorithms such as support vector machine (SVM), random forest (RF), decision trees (DT), regression models, artificial neural network (ANN) etc., to provide automated decision-making (ADM). ADM powered with predictive analytics can gather, process and model health information to render automated decisions [4]. The framework also includes P5 [5] design approach to mHealth that is predictive, preventive, participatory, personalized and psycho-cognitive. Moreover, Just-in-time adaptive interventions (JITAI) for system implementation. JITAI provide digital health interventions with a focus on timeliness. These all together develop the core framework of AI-enabled proactive mHealth

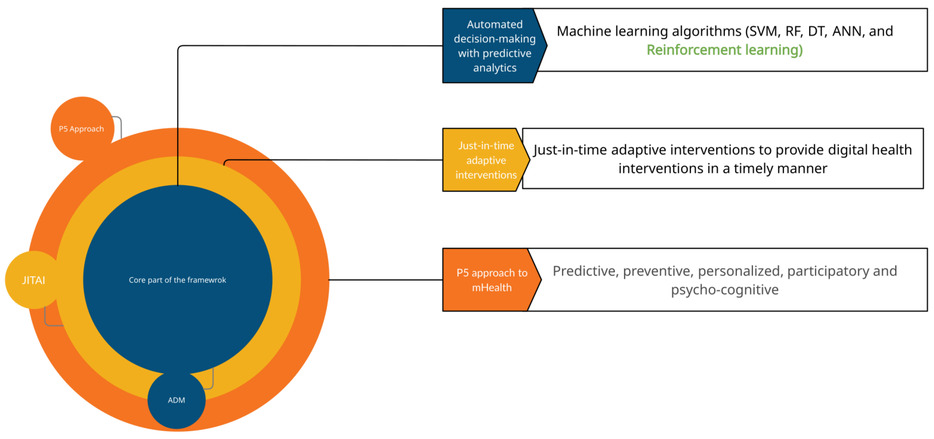

Figure 1: AI-enabled proactive mHealth core framework.

The system with multiple parameters

A personalized system for individuals must consider multiple attributes as input for providing proactiveness. These attributes provide information about the context of the individual like the surroundings along with profiling and characteristics. Information gathered from wearables can provide insights into the current state as well as daily patterns.

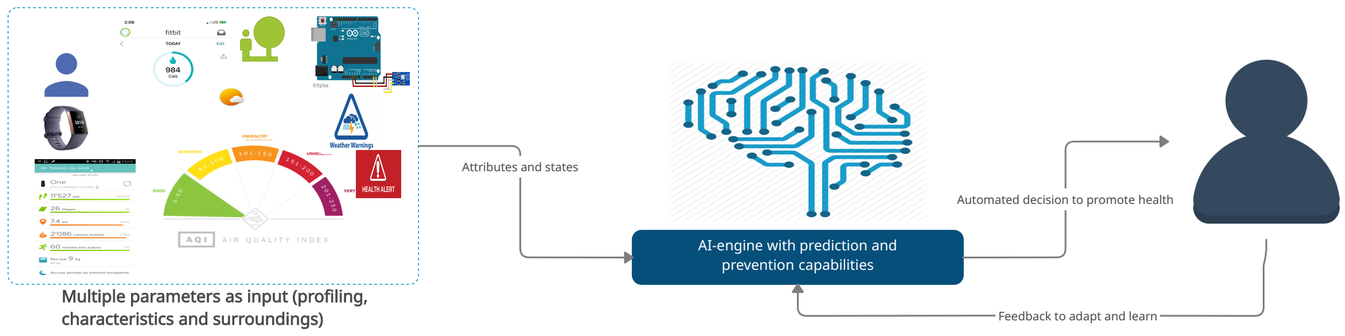

Figure 2: A personalized system with prediction and prevention capabilities, accounting for multiple parameters.

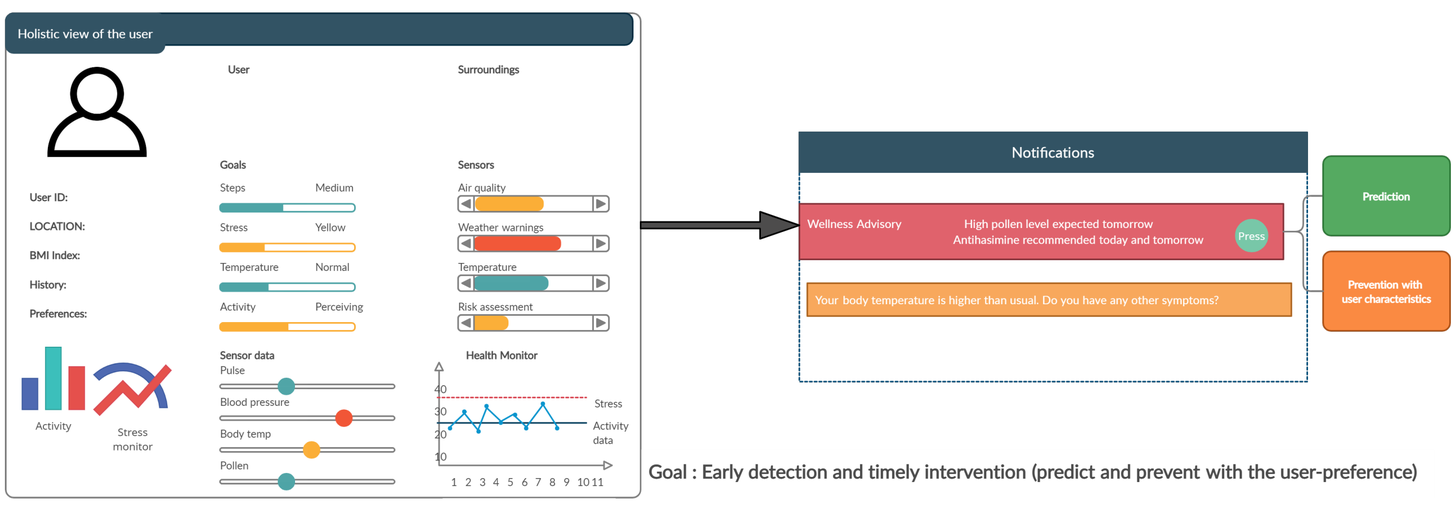

Figure 3: The goal of the system with user's view and automated decision example.

Conclusion

The objective presented here is to establish AI-enabled proactive mHealth to predict and prevent a situation promptly. With automated decision-making powered by predictive analytics to support users on accurate decisions instantly. A personalized system, that considers the uniqueness of a user and considers multiple attributes as input for providing proactiveness. These attributes provide information about the context of the individual like the surroundings along with profiling and characteristics. Information gathered from wearables can provide insights into the current state as well as daily patterns. Conclusively, research is to be conducted to establish proactive mHealth with prediction and prevention capabilities. Automated decision-making with predictive analytics will be the core part of such a system. This includes identifying data sources and applying precise AI techniques.

References

[1] Amir M. *The shift from reactive to proactive*. 2019.
[2] Sharma D. Singh Aujla G. Bajaj R. *Evolution from ancient medication to human-centered Healthcare 4.0: A review*. 2019.
[3] WHO. *eHealth Global Observatory for eHealth*. 2018.
[4] Araujo T. Helberger N. Kruikemeier S. *In AI we trust? Perceptions about automated decision-making by artificial intelligence.* 2020.
[5] Gorini A. Mazzocco K. Triberti S. *A P5 Approach to m-Health: Design Suggestions for Advanced Mobile Health Technology*. 2018.

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