ClearRisk: Enhancing Predictive Modeling and Risk Communication in Digital Health Apps

Keep the Stroke at Bay: Choose a Healthier Way!

Welcome to the world of ClearRisk, where we are embarking on a mission to improve patient outcomes and transform global healthcare. Every year, **millions of people worldwide** lose their lives to **cardiovascular diseases** and events, such as heart attacks and strokes. In light of this, in our EU-funded project called Pre-Care ML, we focus on the early detection of high-risk patients, which allows for timely lifestyle changes that significantly improve health outcomes.

In the Pre-Care ML project, we collaborate with renowned healthcare institutions such as **Mt. Sinai (USA)**, the **Styrian Hospital Association (Austria)**, the **Danderyds Sjukhus Hospital (Sweden)**, and **FMRP-USP (Brazil)**. These collaborations grant us access to extensive patient data from millions of interactions, which we analyze using cutting-edge techniques like **federated learning**. This distributed learning approach prioritizes patient privacy and enables the development of a globally applicable risk prediction model. However, equally important is the presentation of risk predictions to patients in an easily accessible manner, which is often overlooked. And this is where you come in!

Your Part in It You will work on finding the best **ways to communicate risk predictions** to patients and healthcare professionals and making it easily accessible through a **user-friendly smartphone app**. This has the potential to meaningfully impact the lives of millions of people when implemented within hospital information systems in Sweden, Austria, and Brazil. Join us on this journey as we strive to reshape the future of healthcare and improve the well-being of individuals around the world!

What We Want to Achieve

Our goal is to develop a comprehensive system that enables users to access a personalized risk score for major cardiovascular events, like heart attacks or strokes, within the next five years. To achieve this, we will focus on three main components:

1. **Risk Assessment Service (RAS)**: A risk assessment service running on a server within a (simulated) hospital, utilizing previously developed risk prediction models and patient data to provide personalized risk scores.
2. **Model-Based Risk Communication Strategy (RCS)**: An effective strategy to communicate risk information generated by the prediction models.
3. **User-Friendly Smartphone App**: A smartphone app that integrates the best RCS and connects with the RAS, delivering personalized risk scores.

What You Will Learn

Although this is primarily a software development project, you will also face some research challenges. More specifically, you will:

1. Conduct a literature review on risk communication strategies in health apps.
2. Evaluate the impact of different RCSs on patient understanding and behavior. For example through surveys and focus groups.
3. Develop a RAS running on a server, utilizing previously developed risk prediction models and patient data to provide personalized risk scores.
4. Develop a smartphone app which integrates a RCS and communicates with the RAS.
5. Research and implement a safe communication channel between the smartphone app and the RAS.
6. Conduct a pilot study to assess the usability, comprehensibility, and potential impact on behavior of the developed smartphone application.
7. Evaluate the pilot study results and make necessary refinements to the smartphone application and the RCS.

What You Should Bring

You should be interested in doing research and might already have some experience in reviewing scientific literature. Experience in smartphone app development and machine learning also helps you get started on this project. Finally, you will hone your communication and collaboration skills during this project.

Who You Will Be Working With

Medical University of Graz	Styrian Hospital Association	Mount Sinai Health System

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