Nowadays, smartphones are gradually becoming more popular and to be one of the most important belongings in human life. Besides, in the general growth of science and technology, Machine Learning, and Deep Learning have become stronger and to be the hottest keywords in the fields applying information technology. With applying machine learning, applications will be smarter and can give users useful suggestions and advice. With the strong development and popularity of wearable devices such as smartphones, smartwatches and smart bands, the need for mobile-based applications that help humans take care of their health is increasing significantly. In order to have smart healthcare applications, Human Activity Recognition is one of the difficult problems that application developers must face up to. For these reasons, in this thesis, I had studied about the Human Activity Recognition problem, approaches to solve this problem and the way I can implement Machine Learning techniques on mobile. From this theory, I built and trained a simple deep learning model and used it to develop a healthcare application.

For these motivations, the first objective of conducting this thesis is to study about the Human Activity Recognition problem, approaching methods and its applications in real-life. Furthermore, with the objective of developing the application on the mobile platform, I ought to consider mobile-based approaches to this problem. Secondly, research popular machine learning models that have high performance in solving the human activity recognition problem so that I can try to build and train a model for solving it. Besides, I also need to learn the ways I can implement machine learning techniques on mobile and find out the suitable implementation model and frameworks and libraries that support implementing it. Finally, with these studies, I try to implement a machine learning model on Android and build a health-care application that uses this model to recognize human activity in real-time.

The thesis has achieved some good results after a semester of researching and learning new technologies, analyzing the requirements of the system as the desire of the end-user. Firstly, it defines the Human Activity Recognition problem and summarizes approaches to solve it. Secondly, the thesis also summarizes models that are popularly used to implement machine learning techniques on mobile and finds out technologies and libraries that help to store, load and call machine learning models on mobile. Finally, the products of my thesis are an independent module that helps Android developers implement human activity recognition features and a healthcare application that provides users the ability of monitoring their physical activities and health status and reminds users to do exercises when needed. Among these results, my first main contribution is to study the approach of the human activity recognition problem that uses long short-term memory network, build and train a LSTM model that has the average accuracy of 94 percent on “Sensors activity dataset” of Shoaib and the accuracy of 87.5 percent with a practice test. However, it also has some drawbacks like often making mistakes when distinguishing upstairs, downstairs and walking and the smartphone needs to be put in the right direction.

The last contribution of my thesis is to build and publish an independent Android module for developers to implement features that need to recognize human activity easier.