A nutrition logger for professional athletes

Project Management and Software Development
for Medical Applications

General Info

Project Title: A nutrition logger for professional athletes
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Project Abstract

At topathlEAT we work with athletes such as the German Olympic team and optimize their diet for training and competition. The basis for maximizing the performance in competitive sports is a detailed nutrition diary.
Your task is to design a web-interface to best acquire the data for this. The nutrition logger needs to be accessible and editable by both the athletes and our team and is a platform to exchange food images and related meta data.

Background and Motivation

Food quality, portion size and meal timing are important aspects in sports nutrition. They drastically influence the performance in practice and competition, as well as the recovering phase. A long-term neglect of a proper diet can even lead to a higher risk of sickness, injury, and upper respiratory tract infections. To detect deficits early on, athletes usually need to log their daily meals in nutritional diaries, including detailed description, amount, and weight of the meal. Those diaries are the basis to find reasons for bad performance, overtraining or a missing gain of muscle mass.
Many athletes see the logging in this diary as a burden because the logging is a very time expensive task. Experience shows that those nutrition records are often imprecise or not filled out completely resulting in an iterative and very difficult optimization process. We want to change this with a simple system that is capable to record food uptake, portion size and meal timing.

Student's Tasks Description

The goal of the project is a web interface where the individual nutrition data can be uploaded by athletes and it is accessible and editable by the nutrition advisors from topathlEAT.
An optional goal is the use of simple visualization methods to show nutrition relevant statistics in the browser.

The project gives a hands-on experience with a client-server interface and storage of data in a database. It is planned in three phases:
The first phase addresses the project planning. The student interacts with the team of topathlEAT which are nutrition scientists with expertise in sports nutrition (but no IT experts) to understand the capabilities of their server and the necessary properties of the nutrition logger. Research on a suitable open source API is done.
The second phase targets the technical implementation. The student decides on a suitable API that can be used to generate a user database and manages the uploads. Every user is given an ID and assigned an ArUcO marker [4] which can be placed as a printout next to the meal to identify the ID and detect the reference size for later evaluation. A method is implemented that allows to upload food and drink images in an athlete-interface such that the data can be stored on the topathlEAT server where it can also be accessed, adjusted, and edited.
In a third (optional) phase, creative visualization techniques are explored to show and understand relevant nutrition data.

Throughout the project, you gain experience in project management working in an interdisciplinary team also with non-technical experts which requires pragmatic solutions. The interaction offers insights in an exciting new research field and the possibility to learn how sports nutrition influences performance, recovery, and health.

Please send the completed proposal to javier.esteban@tum.de, ardit.ramadani@tum.de, mf.azampour@tum.de and zl.jiang@tum.de.
Please note that this proposal will be evaluated by the BMC coordinators and will be assigned to a student only in case of acceptance.

Technical Prerequisites

- Ideally some experience with web design (or learn to use existing software)
- Willingness to look at open source client-server communication frameworks
- Leverage practical use of databases

References

[1] C. Höchsmann and C. Martin (2020): Review of the validity and feasibility of image-assited methods for dietary assessment.

[2] DA. Williamson et al. (2003): Comparison of digital photography to weighed and visual estimation of portion sizes

[3] J. Knies (2016): Entwicklung und Evaluation eines neuen digitalfotogestützten Instruments zur Erfassung des Lebensmittelverzehrs bei Erwachsenen, Kindern und Jugendlichen

[4] S. Garrido-Jurado, R. Muñoz-Salinas, F. J. Madrid-Cuevas, and M. J. Marín-Jiménez. 2014. "Automatic generation and detection of highly reliable fiducial markers under occlusion". Pattern Recognition.