



Automatic Nutrition Analysis from Images

Project Management and Software Development
for Medical Applications

General Info

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Project Abstract

At topathEAT we work with athletes and patients to optimize their diet for sport performance and health. The basis for maximizing the performance in competitive sports is a detailed nutrition diary.

Your task is to explore how recent advances in food recognition can be leveraged for professional diet analysis with a common nutrition database. A recognized class is assigned to an entry in the database for which specific properties provide insight in the diet quality.

Background and Motivation

Food quality and nutrition intake are important aspects in human diet analysis. Individual adjustments have a significant influence on health, muscular performance, well-being, and fertility.

A long-term neglect of a proper diet can even lead to a higher risk of sickness, lack of performance, over- or underweight, and general discomfort. To detect deficits early on, patients 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 higher risks for special diseases, unhealthy lifestyle, or sources for infertility.

Patients often see the logging in this diary as a burden since it is a very time-consuming task which often causes nutrition records to be imprecise. We want to investigate how much recent progress in data-driven image analysis in food recognition can help to automatize and simplify this process.

Student's Tasks Description

The goal of this project is to connect a food recognition pipeline with a professional nutrition database for semi-automatic nutrition analysis of photographed meals. The project thereby gives a hands-on experience in working with a pretrained neural network for image analysis whose classification results are connected to a nutrition database. This project is organized in three phases:

In the first phase, the student familiarizes her-/himself with the ISIA Food-500 database and the pretrained model to recognize food in images [1].

The second step is to exchange ideas of connecting the classes and their organization structure with a professional nutrition database in interaction with the team of topathEAT. At the end of this phase, a food image is assigned to one or multiple entries within the professional database.

The last phase aims to provide a simple user interface for the nutrition scientist to manually input the weight of a specific ingredient to calculate the nutrition properties of the meal.

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 nutrition influences muscular performance, fertility, and health.

Technical Prerequisites

Willingness to use Python and Pytorch to run an inference of a deep neural network.

References

- [1] W. Min et al. ISIA Food-500: A Dataset for Large-Scale Food Recognition. ACM International Conference on Multimedia 2020 (pp. 393-401).