SmartNutri

A web-based tool for you to monitor nutrition consumption

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Introduction

Hong Kong’s new nutrition labelling scheme was introduced by the government in 2010. Even though health-consciousness has increased over the years, not many consumers have the habit of reading nutrition labels. The values on the labels are sometimes difficult to understand for general consumers. We have designed and implemented a diet tracking tool that keeps track of a person’s daily consumptions based on nutrition labels as input.

The tool makes use of Optical Character Recognition (OCR) technology to analyze images of nutrition labels, taken by users on their smartphones (or digital cameras). Through a web user interface, the images are sent to a server, on which the OCR is run. The server also stores all user data to provide a convenient centralized storage. The Web UI is executable across all popular platforms, enabling users to use this tool anytime and anywhere.

Design

Client - Server interaction

<table>
<thead>
<tr>
<th>Client (User)</th>
<th>Server</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Register Label</strong></td>
<td></td>
</tr>
<tr>
<td>Uploads photo of nutrition label</td>
<td>Performs OCR on the nutrition label Stores analyzed data into database</td>
</tr>
<tr>
<td><strong>2. Record consumption</strong></td>
<td></td>
</tr>
<tr>
<td>Inputs <em>servings</em> of food consumed (user can skip Step 1 when the same food is consumed again)</td>
<td>Analyzes user’s cumulative consumption based on consumption amount</td>
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<tr>
<td><strong>3. Consumption history and Display alert level</strong></td>
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<tr>
<td>Requests consumption statistics over a specific period, e.g. 1 day or 1 week</td>
<td>Shows statistics of cumulative amount of nutrients consumed Display a ‘safety level’ for selected nutrients, e.g. ‘Alert’, ‘Moderate’ or ‘Low’ level of sodium intake</td>
</tr>
</tbody>
</table>
We designed a user-friendly platform-independent Web UI with simple charts to help users understand complicated data clearly.

Navigation Page
Link to upload label, record consumption and view consumption history page. A chart showing today’s consumption to alert user.

Register a new food for the system
Upload barcode
Upload label
Food Browser

Pattern Recognition pattern matching by modified sliding-window technique

\[ SSD_{m,n} = \sum [S_{i,j} \oplus T_{i,j}] \]
Implementation

Server-side technology
We use Apache Tomcat as our servlet container, MySQL as database storage and MATLAB for OCR engine.

Evaluation

Speed for OCR
Average time used: 28.95s

Accuracy for OCR
Average: 68.5% (Number of images tested: 25)

Assumptions for Input Image
- Upright and centered
- Good lighting
- Sharp camera focus
- Label occupies (>70% of the image)
- Enough resolution (> 200K pixels)

Hardware Requirement for End User
- PC or Smartphone with web browser installed
- Camera with >2M resolution and auto focus