NutriChip SmartCam: an embedded image processing system for live surface receptor monitoring

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Objectives
Extracting fluorescent spots [1] in microscopy images. The resulting mask provides access to measurements (intensity, segmented blob sizes, …) that can be linked with a biological event [2] (e.g. surface receptor expression like TLR2).

We introduce a Smart Camera based system for live cell monitoring
• Embedded image processing (hardware and software) and data extraction on FPGA
• Custom controlling software

Scope
The NutriChip project proposes to study the impact of dairy products ingestion by human through the use of a Lab-on-Chip platform.

Fluorescently stained biomarkers such as the toll-like receptors 2 and 4 (TLR2-4) are used to get a measurement of the cell immune response.

Processing chain and Engineered system

Segmentation and data extraction [1]
Various state-of-the-art algorithms and a custom algorithm are taken under consideration.

Pre-filtering (Optional):
• FPN removal
• Top-Hat Operator

Thresholding:
• Global:
  • Basic Average
  • Ostu(2X)T-point
• Local:
  • Sauvola, Ghaye

Data extraction vs mRNA quantification[2]
High Correlation between mRNA quantification (gene expression) by PCR and TLR2 by estimations on images treated with Otsu2x.

References