Determining Leishmania Infection Levels by Automatic Analysis of Fluorescence Microscopy Images

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Abstract: Leishmania (http://www.who.int/tdr/diseases/leish/default.htm) is a parasite that affects Man and dogs and that is present in many regions of the World, Portugal included. Infection by Leishmania may be fatal, but no satisfactory treatment is available. Within the human host Leishmania infects macrophages, cells of the immune system that are usually responsible for microorganism clearance. Accordingly, the importance of Leishmania research is two-fold: (i) to develop new formulas to combat the parasite; (ii) to use Leishmania as a model organism to study the immune system.

Determination of the level of parasite infection in macrophages is a central tool in Leishmania research. At present, such evaluation is performed manually by microscopic observation and, as so, it has many drawbacks: (i) it is prone to human errors, requiring frequent repetitions to validate results; (ii) it is time-consuming; (iii) it is fatiguing (Chang et al. 2004, Parasitol. Res. 94:243-5). Automation using robust image processing techniques can overcome these limitations, boosting research in this important field.

The objectives of this work include:
- Research and develop robust automatic parasite and cell counting algorithms using computer vision methodologies.
- Integrate results into the CellNote software platform, developed by our group.
- Field validation of all results.

Figure 1 – Examples of fluorescence microscopy images.
Relevant References:
http://www.springerlink.com/content/ayj3wq2pc9rhdwjn/fulltext.pdf
[2] Cell Profiler cell image analysis software Website –  

Additional information:
- This project is a cooperation between the Department of Computer Science at FCUP and the IBMC Laboratory.