

1. Title

Annotation of Cellular Data

2. Supervision

Hugo Pedro Proença (UBI-DI)

3. Description

Biomedical research typically requires the collection of very high quantities of microscopy images, with its subsequent manual or semi-automatic analysis using support software. This task is slow, subjective and very tiring, which motivates its full automation, allowing scientists to devote their full attention to the more critical issues of their research. [1-6] The CellNote Touch project will combine research in computer vision and human-computer interaction to create an interactive touch-based tool for an improved analysis and annotation of cellular images that can run on a simple tablet-type computer.

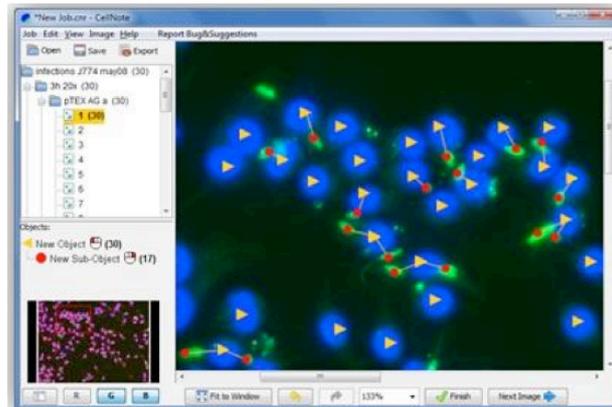


Figure 1: Screenshot of CellNote v1.5, currently used by various research groups at IBMC - INEB - Porto

Hence, the main objectives of this Master dissertation are:

- Research novel adaptable computer vision algorithms for automatic cell annotation and counting.
- Integrate the research contributions into a fully working prototype running on a tablet-type PC.
- Deploy and test the developed prototype.
- Publish results in high-impact scientific journals and conferences.

4. Workplan

- 1- Comparative study of the methods previously published.
- 2- Development, implementation and test of a strategy to perform the automatic annotation of cellular data.
- 3- Publication of the proposed approach in an ISI-indexed International journal or conference.

5. Chronogram

	J	J	A	S	O	N	D	J	F	M	A	M	J	J
Gutierrez "PatternAnalysis"														
Matlab (OCR)														
Estado-da-Arte														
Resumo comparativo / crítico														
Abordagens propostas (T)														
Implementação														
Testes/Validação/Refinamento														
Elaboração publicação														
Tese (Redação)														
Tese (Revisão)														

6. Pré-Requisites

- Basic skills in English writing/reading.
- Ability to use programming languages.

7. References

- [1] R. Adams and L. Bischof, "Seeded region growing," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 16, no. 6, pag. 641–647, Jun. 1994.
- [2] Yongming Chen, Kevin Biddell, Aiyang Sun, Patricia A. Relue, Jeffrey D. Johnson, "An Automatic Cell Counting Method for Optical Images", in Proceedings of The First Joint BMEEMBS Conference Serving Humanity, Advancing Technology, pag. 819, 1999, USA
- [3] Geisa Faustino, Marcelo Gattass, Carlos Lucena, Priscila Campos and Stevens K. Rehen, "Improved Automatic ES Cells Counting Method in Fluorescence Microscopy Images", in Proceedings of the IWSSIP 2010 - 17th International Conference on Systems, Signals and Image Processing, pag. 296-299, 2008.
- [4] Y.L.Fok, J.C.K.Chan and R.T.Chin, "Automated analysis of nerve-cell images using active contour models," IEEE Transactions on Medical Imaging, vol. 15, no. 3, pag. 353–368, Jun. 1996.
- [5] D. Baggett, M. A. Nakaya, M. McAuliffe, T. P. Yamaguchi, and S. Lockett, "Whole cell segmentation in solid tissue sections," Cytometry A, vol. 67A, pag. 137–143, 2005.
- [6] G. Xiong, X. Zhou, and L. Ji. "Automated Segmentation of Drosophila RNAi Fluorescence Cellular Images Using Deformable Models", IEEE Trans. on Circ. and Syst., vol. 53, no. 11, pag. 2415–2424, 2006.

[