MICHAŁ PODPORA
Faculty of Electrical Engineering Automatic Control and Informatics
Institute of Control and Computer Engineering

TASK PARALLELIZATION OF IMAGE RECOGNITION PROCEDURES IN A COMPUTER CLUSTER

Abstract: In this paper author describes the advantage of using the task parallelism when processing video systems' data stream in a computer cluster.

The most problematic issue in using a computer cluster as an enhancement of robot's memory and/or association ability is the communication time. Input data of robot's vision system, i.e. images from its camera, produce extremely high volume of the traffic. No parallel algorithm could manage it.

The idea of yellow spot presented in [1] significantly reduces data size while preserving the highest possible image quality in the Point-of-Interest area. This in turn enables the possibility of using a computer cluster.

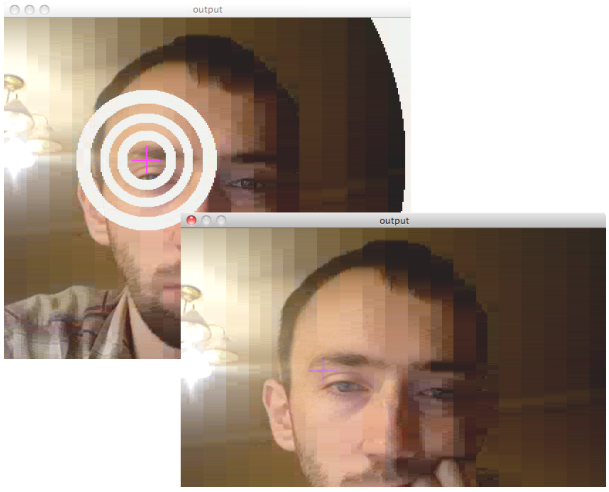

Fig. 1. The Point-of-Interest conception
(with and without contour lines showing variation of the threshold value)

The visual systems' parallel inference algorithm should be designed to use task parallelism rather then data parallelism [2]. Analysis of half of an image is pointless, although some data parallelism can also be considered, depending on the case of use. An appropriate decomposition strategy adjusts the efficiency of parallel (cluster) algorithms implementation [3]. The proposed image representation algorithm is HTM-ready, which means when the

NuPic 2.0 is released in June 2010, further development of the vision systems' AI algorithm will speed up.

The decomposition of processing tasks does not have to be complicated. Human brain also decomposes visual input and sends it to specialized centers and/or regions [4]. While the communication restrictions have been overcome, task parallelism becomes easy and natural in vision understanding.

If a machine is supposed to behave/be more like a human, why not make it "see" the world "our way"?

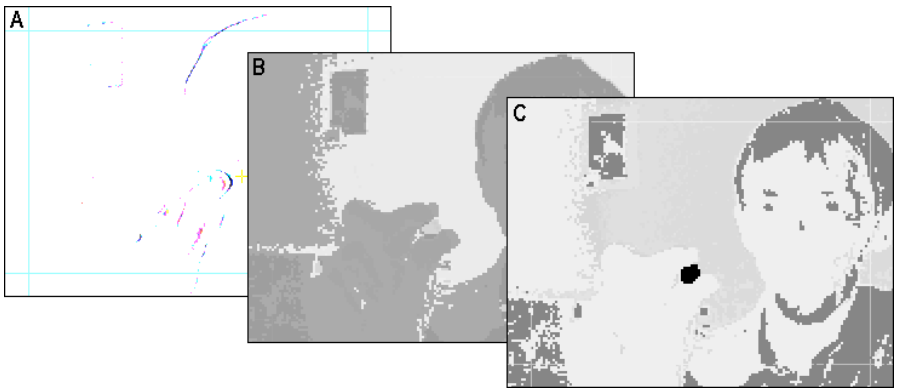

Fig. 2. Simple task parallelization of image recognition
(A – movement detection, B – red channel, C – green channel)

REFERENCES

[1] Podpora M., Biologically reasoned machine vision: RLE vs. entropy-coding compression of DWT-transformed images, Proceedings of the 14th Conference Student EEICT 2008 vol.4, ISBN 978-80-214-3617-6, Brno 2008, pp 457-460

[2] edt.: Hippe Z., Kulikowski J., Human-Computer Systems Interaction – Backgrounds and Applications, chapter IV – Robots and Training Systems :
Podpora M., Sadecki J., Biologically reasoned point-of-interest image compression for mobile robots, ISBN 978-3-642-03201-1, Springer 2009, pp 389-401

[3] Sadecki J., Parallel optimization algorithms and investigation of their efficiency: parallel distributed memory systems. Opole University of Technology, Opole 2001

[4] Hawkins J., Blakeslee S., On Intelligence, Times Books, ISBN 978-0-805-07456-7, 2004

Work co-financed by European Social Fund