

**Title:** *Processing biomedical images on GPU: implementation of an optimized CUDA library*

**Authors:** Antonio Ruiz, Manuel Ujaldón, Timothy Hartley, Umit Catalyurek, Francisco Igual, Rafael Mayo

**Abstract:**

Automatic prognosis of pathologies, such as cancer, is a high performance demanding application. The emergence of the newest generations of hardware accelerators has renewed the interest of many scientists in this field. One of the most extended accelerating architectures is the graphics processor. In addition, the advances in programmability, with new APIs like CUDA, provide an attractive platform to achieve impressive speedups for some applications.

We propose a highly tuned library implementation in CUDA for the processing and classifying of biomedical tissue images, focusing three main fields: image processing, feature extraction and classifying. Performance results are shown for each routine implementation, and optimizations are proposed and evaluated. In addition, we propose a multinode implementation based on a CPU/GPU cluster, attaining remarkable scalability results.

**Affiliation:**

- Universidad de Málaga: Antonio Ruiz, Manuel Ujaldón.
- Ohio State University: Timothy Hartley, Umit Catalyurek.
- Universitat Jaume I de Castellón: Francisco Igual and Rafael Mayo.