CS Masters' Thesis Defense

Title: *CUDA Implementation of Parallel Algorithms for Animal Noseprint Identification*
Speaker: Vincent Stanley Dayes
Date: Friday, April 20, 2012
Time: 11:30 a.m.
Location: GMCS 405
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Abstract:
Concern about the threats posed by natural proliferation of animal-borne human diseases like BSE ("mad cow disease") and by the possible use of animals as disease vectors in bioterrorism, have spurred heightened interest in the development of methods for rapid automated identification of individual animals of various societally and commercially important mammalian species.

Just as fingerprints have been used successfully for more than a century to uniquely identify human individuals, evidence suggests that the noseprints of many mammalian species are also unique to individual animals and therefore could function as a reliable basis for identification. Unfortunately, animal noseprints do not in general exhibit the "core" and "delta" features that are always present in human fingerprints and are used to define the intrinsic coordinate system upon which modern minutiae-based fingerprint analysis is based. Therefore conventional automated fingerprint analysis technology cannot be used for animal noseprint identification.

In 2004, FBI Special Agent Steven Kozma, in a master's thesis project conducted at San Diego State University, proved that 2D image correlation, a pattern matching method widely used in other contexts, can be used to match canine and bovine noseprints with high accuracy. However, the execution time of Kozma's software when run on typical commercial off-the-shelf hardware was too great to make it practical for real-world applications.

This thesis project encompassed design, coding, and testing of a CUDA-based parallelization of Kozma's algorithm, including proof-of-concept testing for a new variant incorporating Hotelling-transform-based rotational and translational image registration, with the goal of achieving a speedup of Kozma's original algorithm sufficient to render it practical for use in real-world applications.