College of Engineering
Summer Research Experience for Undergraduates Program

Request for an Engineering Student for Summer 2012 Research

Faculty Name: Marco F. Duarte

Phone: 413-545-8583

Department: Electrical and Computer Engineering Email: mduarte@ecs.umass.edu

Brief description of Summer Research Project (please explain the interdisciplinary nature of this project).

The purpose of this project is to design numerical feature vectors for natural images that capture structure present in the image at a variety of scales, from local information (at the pixel level) to global information (across the entire image). Structure includes the presence of edges or textures in the image and the density of such information across the image. Applications of interest include biomedical imaging (detection and classification of melanoma skin sample images), biology (detection of denticle mutation in fruit fly from microscopy images) and art analysis (dating and authentication of paintings).

Brief description of what the student will be doing:

The student will design and implement methods for feature extraction from images and test their discriminability for the aforementioned structural image cues. The student will learn about and leverage wavelet representations to capture multiscale structure in natural images. The student will then use the features with machine learning algorithms to perform image processing tasks such as detection, classification, clustering, and labeling.

Is this a CASA-related project? Yes ___ No X

Preferred background of student (major(s), class, GPA, pre-requisites, etc.):

Preferred majors are EE, CSE, and CompSci. EE/CSE students should have taken Signals and Systems ECE 313 or equivalent; Digital Signal Processing ECE 565 or equivalent is a plus. CS students should have taken Intro. to Computer Vision CS 370 or equivalent; Machine Learning CS 589 or equivalent is a plus. Student should have interest in signal and image processing.

Did you mentor a student last summer in the College REU Program? Yes____ No X

If yes, please describe the outcomes for that student (i.e. Honor's thesis, conference presentations, manuscripts, papers, etc. Describe accomplishments to date as well as plans for the spring semester if the work has continued):

Please return this form to: lrobidou@ecs.umass.edu by February 3, 2012