Masters Internship Position

« Use of stochastic geometry to detect pimples and pinheads on acne colour images »

Where: INRIA, Sophia Antipolis (near Antibes on the French Riviera), France.

Research group: Ariana/Ayin   http://www-sop.inria.fr/ariana

Internship advisor

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Context:

The condition of the skin of a healthy human significantly varies with age. The skin of a young adult is generally flawless, presenting a smooth surface, without wrinkles and without discolorations. The Stratum Corneum is well hydrated, the epidermis has a relatively fast turnover, the pigmentation that arises in the basal layer is homogeneous and the dermis is strong, supple and elastic. When the person ages, the epidermal turnover slows down, the moisture content of the Stratum Corneum decreases, pigmentation becomes uneven, the collagen and elastin network in the dermis becomes brittle, and the skin becomes thinner. The effect is that older skin appears dull, wrinkly and uneven in color. Some of the changes in skin over time have to do with chronological ageing, others with extrinsic ageing brought about, for instance, by sun exposure and smoking. In addition, certain cosmetic irregularities can appear in a certain stage of life due to hormonal influences like acne and melasma.

Goal of the internship:

In the Ariana research group we have developed a first model for detecting hyper-pigmentation lesions such as melasma for instance. Pathological areas have been detected on hyper-spectral images using support vector machines (SVM) associated with a data reduction process like projection pursuit. A classification algorithm has been proposed to distinguish healthy versus pathological skin.

The goal of this Master internship is first to test this method on acne color images, and then to propose a new model based on stochastic geometry (marked point process) to detect pimples (pustules) and pinheads (papules). The validation of the results will be done in collaboration with a dermatologist.

Profile
The ideal candidate should have knowledge of image processing and applied mathematics, and be able to program in C++ and Matlab.

Salary and conditions:
The duration of the internship will be five to six months. Salary is €1100 per month net, including health care, if no funding from another body. For further details of life at INRIA and on the French Riviera, see the Ariana web site http://www-sop.inria.fr/ariana.

PhD continuation: possible if good results are obtained.