UNIVERSITY OF GENOA
DEPARTMENT OF INFORMATICS, BIOENGINEERING, ROBOTICS AND SYSTEMS ENGINEERING
MASTER'S PROGRAM IN BIOENGINEERING

Thesis Project Form

Title (tentative): Bio-inspired computational models for scene flow estimation

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Description

Motivation and application domain

The application domain of this thesis is the study and development of novel bio-inspired models for scene flow estimation. In the computer vision field, the scene flow is the three-dimensional motion of points in the world. Scope of the work is to combine the methods (and algorithms) from computer vision with experimental evidence from psychophysics in order to devise neural models of the 3D motion perception.

General objectives and main activities

The objective of this thesis is to develop a bio-inspired computational model, based on experimental evidence and computer vision methods, to achieve a stable estimation of 3D motion, since it is a crucial ability for natural and artificial agents to interact with a real environment, e.g. to avoid obstacles and to reach an object. The expected result is a neural model for motion and depth estimation, and its assessment in artificial and real conditions. To this aim, the following aspects should be considered: (i) analysis of the available bio-inspired models for optic flow and disparity estimation; (ii) analysis of the issues related to the estimation of scene flow; (iii) development and implementation of a neural model for scene flow estimation and its quantitative evaluation.

Training Objectives (technical/analytical tools, experimental methodologies)

- Analysis of scene flow neural models and algorithms available in the literature.
- Development of an innovative neural model to obtain a robust estimation of 3D motion.
- Implementation of the model in Matlab.
- Quantitative evaluations of the model functionalities are expected.

Place(s) where the thesis work will be carried out: DIBRIS (genova)

Additional information

Pre-requisite abilities/skills: Computer Vision, 3D geometry and Matlab programming.

Maximum number of students: 2