Titolo (provvisorio): Bio-inspired models for 3D motion computation

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**Motivazione e campo di applicazione**

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.

**Obiettivi generali e principali attività**

The objective of this thesis is to develop a bio-inspired 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 the integrated neural model and its quantitative evaluations in real situations.

**Obiettivi di apprendimento (strumenti tecnici e analitici, metodologie sperimentali)**

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

**Informazioni aggiuntive**

Abilità e capacità richieste: Computer Vision, 3D geometry and Matlab programming

Numero massimo di studenti: 2