Application BASTRI

Fiches Equipes

BIOVISION (SR0719RR)

Biologically plausible Integrative mOdels of the Visual system : towards synergIstic Solutions for visually-Impaired people and artificial visiON
NEUROMATHCOMP (SR0260TR) BIOVISION BIOVISION (SR0846CR)

Statut: Terminée

Responsable : Bruno Cessac

Mots-clés de "A - Thèmes de recherche en Sciences du numérique - 2024" : *Aucun mot-clé.*

Mots-clés de "B - Autres sciences et domaines d'application - 2024" : *Aucun mot-clé.*

Domaine : Santé, biologie et planète numériques
Thème : Neurosciences et médecine numériques

Période : 01/01/2016 -> 01/08/2018
Dates d'évaluation :

Etablissement(s) de rattachement : <sans>
Laboratoire(s) partenaire(s) : <sans UMR>

CRI : Centre Inria d'Université Côte d'Azur
Localisation : Centre Inria d'Université Côte d'Azur
Code structure Inria : 041150-0

Numéro RNSR : 201622040S
N° de structure Inria: SR0719RR

Présentation

Voir est une fonction essentielle pour appréhender le monde et exécuter des tâches complexes. C'est un sens avec d'une grande efficacité dans un environnement bruité, changeant et ambigü. Mieux comprendre les mécanismes biologiques de la vision aura dans un futur proche un impact essentiel aux niveaux scientifique, medical, sociétal et technologique. Dans ce contexte Biovision souhaite développer recherche fondamentale et transfert technologique selon deux axes:

> L'axe 1 s'intéresse au développement de nouvelles techniques high tech pour patients en basse vision.
>
> L'axe 2 est dédié à la modélisation du système visuel en conditions normales et pathologiques avec l'objectif de développer des applications pour les patients en basse vision ou aveugles.

Ces axes sont développés en synergie, et impliquent un réseau de collaborateurs nationaux et internationaux incluant neurobiologistes, médecins et modélisateurs.

Axes de recherche

Axis 1: High tech vision aid systems for low vision patients
The most popular class of vision aid systems for low vision patients is based on the idea of magnification.
These aids are helpful for tasks such as reading but of course are not useful in other common daily tasks such
as navigation. Video goggles are another kind of device where visual information is captured by a head-mounted camera,
processed and then displayed on a near-the-eye display screen. So far, this technology did not encountered a
big success essentially due to their narrow field of view. This situation could evolve with the fast progression
of technology around virtual reality and augmented reality.
In BIOVISION we mainly focus on this technology to develop new vision aid systems that could take into
account the pathologies of low vision patients but also on the tasks performed by the patients. We have three
main goals:

Contact

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En savoir plus

- Site de l'équipe
- Site sur inria.fr
- Site du responsable
- Derniers Rapports d'Activité : 2016 , 2017 , 2018 , 2019 , 2020 , 2021 , 2022 , 2023 , 2024

Documents sur la structure

- Intranet
- Privés

Décisions

- 11302 (21/12/2015) : création
- 11922 (30/11/2016) : prolongation
- 12456 (03/11/2017) : prolongation
- 13228 (06/12/2018) : fermeture

Localisation

- **Adresse postale :** Centre Inria d'Université Côte d'Azur 2004 Route des Lucioles - BP 93 06902 Sophia Antipolis cedex France
- **Coordonnées GPS :** 43.616, 7.068

1. We plan to focus on three tasks: reading, watching movies and navigating (indoor or outdoor), which
are all important daily life activities for patients.
2. We aim at proposing new scene enhancements depending on pathologies.
3. We want to test them in immersive environments with low vision patients, taking into consideration
ergonomics.

Axis 2: Human vision understanding through joint experimental and modeling studies, for normal and distrophic retinas

A holistic point of view is emerging in neuroscience where one can observe simultaneously how vision works
at different levels of the hierarchy in the visual system. Multiple scales functional analysis and connectomics
are also exploding in brain science, and studies of visual systems are upfront on this fast move. These integrated
studies call for new classes of theoretical and integrated models where the goal is the modeling of visual
functions such as motion integration.
In BIOVISION we contribute to a better understanding of the visual system with three main goals:

1. We aim at proposing simplified mathematical models characterizing how the retina converts a visual
scene into spike population coding, in normal and under specific pathological conditions.
2. We want to design an integrated numerical model of the visual stream, with a focus on motion
integration, from retina to visual cortex area (e.g., the motion stream V1-MT-MST).
3. We plan to develop a simulation platform emulating the retinal spike-response to visual and
prosthetic simulations, in normal and pathological conditions.

Finally, although this is not the main goal of our team, another natural avenue of our research will be to develop
novel synergistic solutions to solve computer vision tasks based on bio-inspired mechanisms.

Relations industrielles et internationales

- Institut de Neurosciences de la Timone, Marseille, France
- Institut de la Vision, Paris, France .
- Laboratoire de Psychologie Cognitive, Aix-Marseille Université, France
- Institute for Adaptive and Neural Computation, University of Edinburghn Edinburgh, United Kingdom
- Department of Informatics, Bioengineering, Robotics, and Systems Engineering-DIBRIS, University of Genova, Genova, Italy
- Universidad de Guanajuato, Departamento de Ingeniería Electrónica, Mexico
- Institute of Neuroscience, Newcastle University, Newcastle, United Kingdom
- Institute of Neural Information Processing, Faculty of Engineering and Computer
  Sciences, Ulm University, Ulm, Germany
- UVal Centro Interdisciplinario de Neurociencia de Valparaiso, Valparaiso University,
  Valparaiso, Chili