S’il fallait tout recommencer…

Radu Horaud

Jeudi 10 novembre 2022

1976-1978
Penser à sa future vie professionnelle

- Faire un doctorat en physique ?
- DEA d'électrotechnique, de traitement du signal, ou d'automatique ?
- Choisir un stage de fin d'études
- Rencontre avec mon futur directeur de thèse

Avril à juillet 1977 : stage au LETI-CEA

Sujet de stage : Reconnaissance de formes dans une image

« *L'intuition est un des grands mystères de l'esprit humain* »
(John Steinbeck, Sweet Thursday)

1978-1979 : DEA d’automatique

- Mars 1978 : Rendez-vous avec Marcel Nougaret au Laboratoire d’Automatique de Grenoble
- Collaboration avec Jean-Pierre Charras

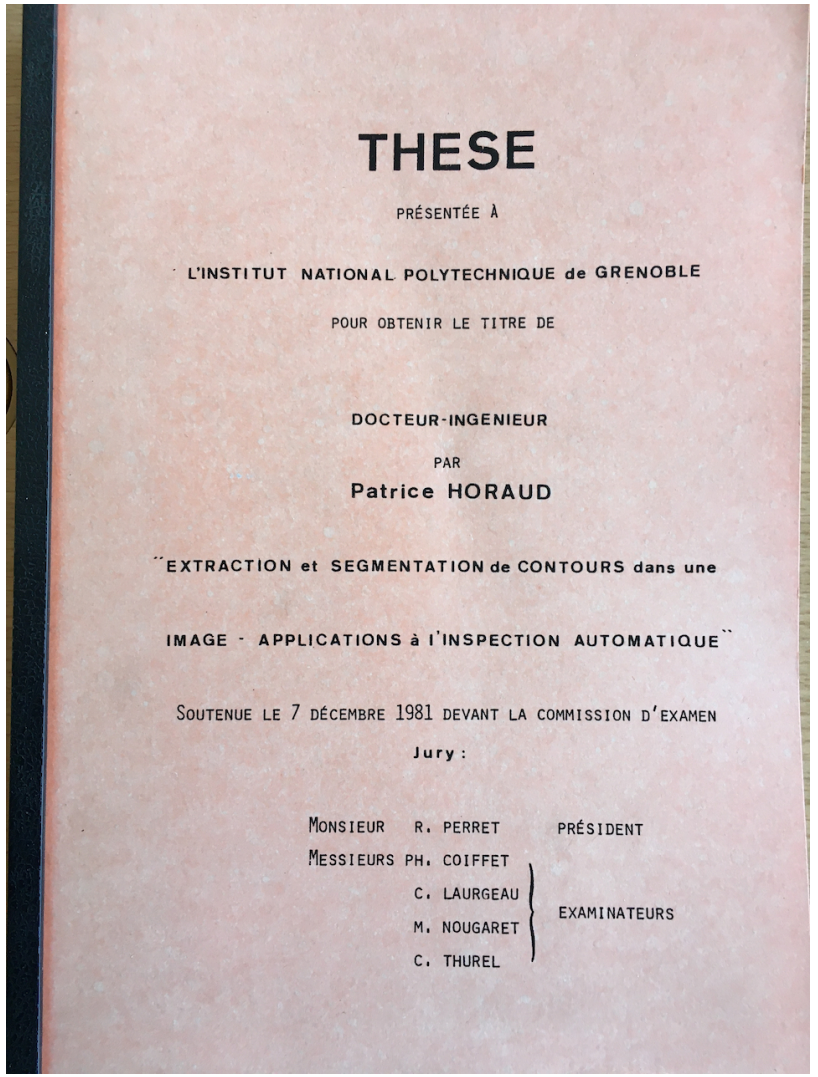
Caméra video AATON (1977-1988)

Première publication

Automatic inspection and orientation of external screws

Authors	R Horaud, JP Charras
Publication date	1980/3
Conference	Proceedings of the Fifth International Conference on Pattern Recognition (ICPR'80)
Publisher	IEEE Computer Society Press
Description	Source INTERNATIONAL CONFERENCE ON AUTOMATED INSPECTION AND PRODUCT CONTROL. 5. INSTITUT FUER PRODUKTIONSTECHNIK UND AUTOMATISIERUNG. ARBEITSTAGUNG. 15/1980/STUTTGART; GBR; BEDFORD: IFS PUBLICATIONS; DA. 1980; PP. 125-141; BIBL. 19 REF.
Total citations	Cited by 12

1979-1981 Thèse de docteur-ingénieur Laboratoire d'Automatique de Grenoble



THESE

PRÉSENTÉE À

L'INSTITUT NATIONAL POLYTECHNIQUE de GRENOBLE

POUR OBTENIR LE TITRE DE

DOCTEUR-INGENIEUR

PAR

Patrice HORAUD

"EXTRACTION et SEGMENTATION de CONTOURS dans une IMAGE - APPLICATIONS à l'INSPECTION AUTOMATIQUE"

SOUTENUE LE 7 DÉCEMBRE 1981 DEVANT LA COMMISSION D'EXAMEN

Jury :

MONSIEUR R. PERRET — PRÉSIDENT

MESSIEURS PH. COIFFET, C. LAURGEAU, M. NOUGARET, C. THUREL — EXAMINATEURS

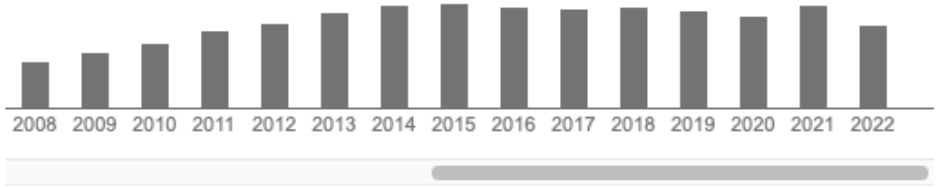
1982-1984 : SRI International, Menlo Park, California, USA

Caméra 3D Intel Realsense

Bob Bolles

Random sample consensus: a paradigm for model fitting with applications to image analysis and automated cartography

Authors	Martin A Fischler, Robert C Bolles
Publication date	1981/6/1
Journal	Communications of the ACM
Volume	24
Issue	6
Pages	381-395
Publisher	ACM
Description	A new paradigm, Random Sample Consensus (RANSAC), for fitting a model to experimental data is introduced. RANSAC is capable of interpreting/smoothing data containing a significant percentage of gross errors, and is thus ideally suited for applications in automated image analysis where interpretation is based on the data provided by error-prone feature detectors. A major portion of this paper describes the application of RANSAC to the Location Determination Problem (LDP): Given an image depicting a set of landmarks with known locations, determine that point in space from which the image was obtained. In response to a RANSAC requirement, new results are derived on the minimum number of landmarks needed to obtain a solution, and algorithms are presented for computing these minimum-landmark solutions in closed form. These results provide the basis for an automatic system that can solve the LDP …
Total citations	Cited by 29920



International Journal of Computer Vision, 6:1, 59–70 (1991)

Robust Regression Methods for Computer Vision: A Review

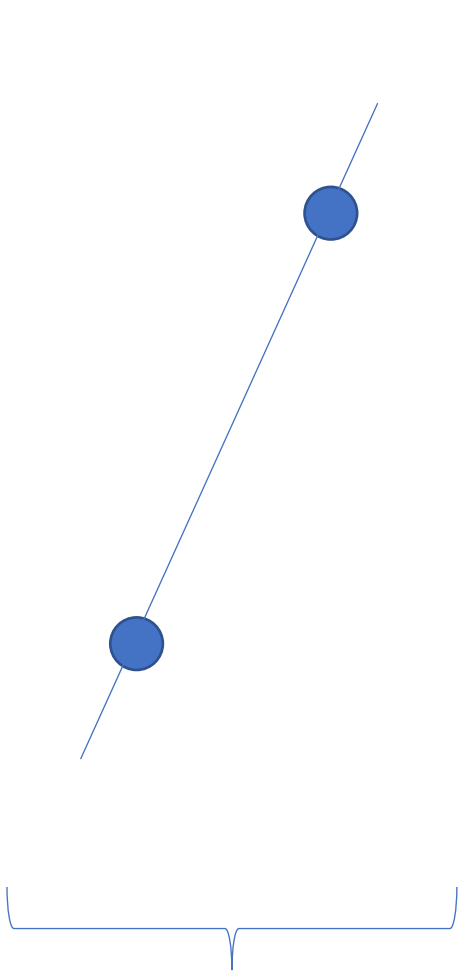
PETER MEER,* DORON MINTZ, AND AZRIEL ROSENFELD
Center for Automation Research, University of Maryland, College Park, MD 20742

DONG YOON KIM
Agency for Defense Development, P.O. Box 35, Taejeon, Korea

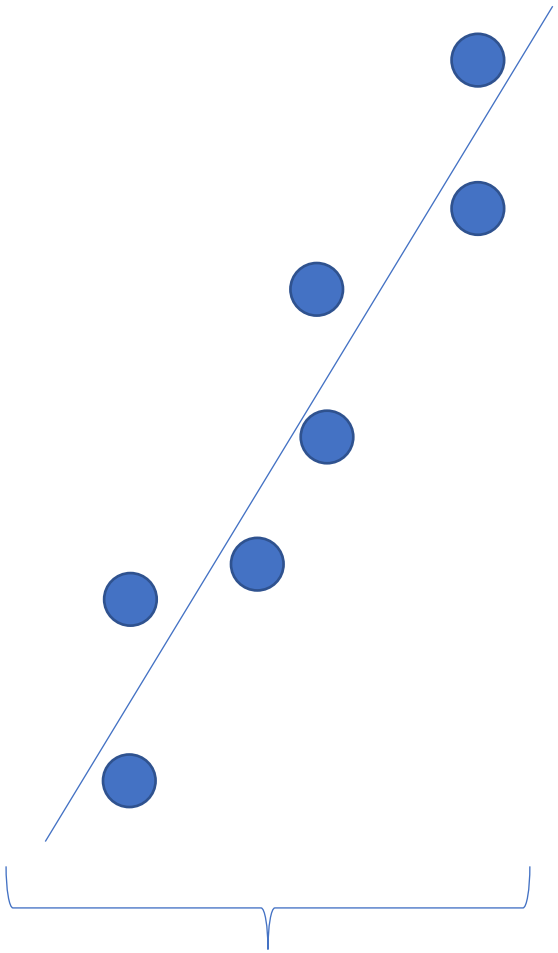
Abstract

Regression analysis (fitting a model to noisy data) is a basic technique in computer vision. Robust regression methods that remain reliable in the presence of various types of noise are therefore of considerable importance. We review several robust estimation techniques and describe in detail the least-median-of-squares (LMedS) method. The method yields the correct result even when half of the data is severely corrupted. Its efficiency in the presence of Gaussian noise can be improved by complementing it with a weighted least-squares-based procedure. The high time-complexity of the LMedS algorithm can be reduced by a Monte Carlo type speed-up technique. We discuss the relationship of LMedS with the RANSAC paradigm and its limitations in the presence of noise corrupting all the data, and we compare its performance with the class of robust M-estimators. References to published applications of robust techniques in computer vision are also given.

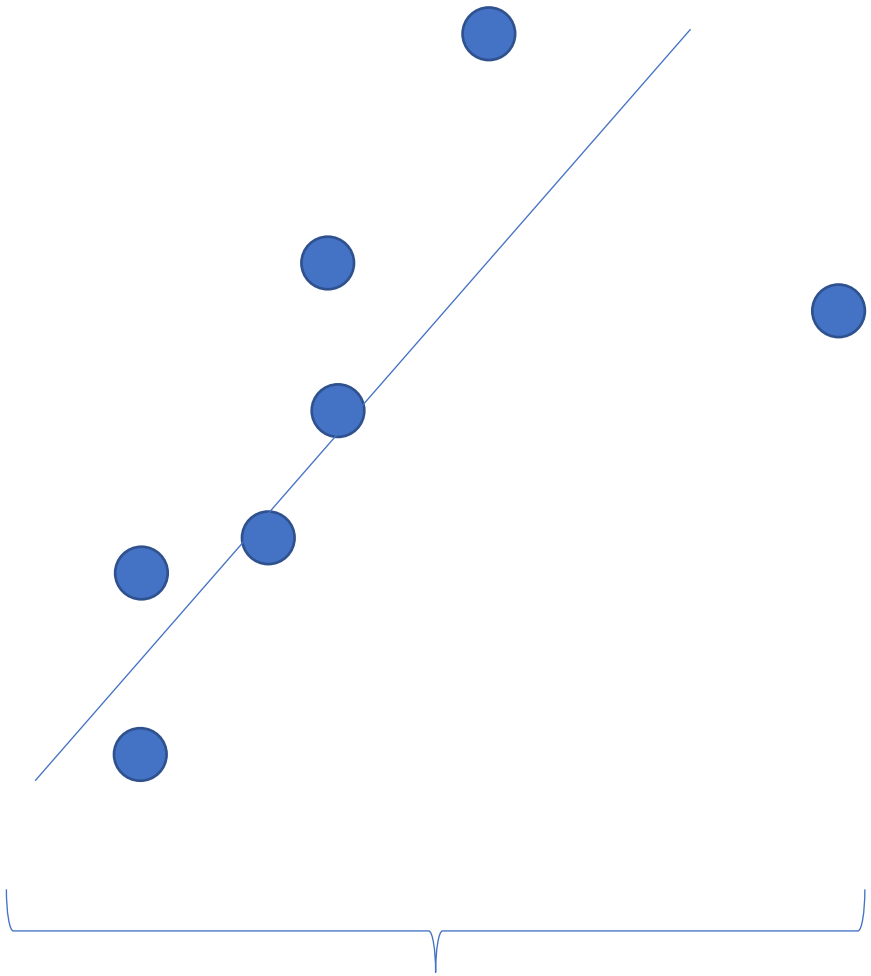
Quel est le problème ?



Solution exacte

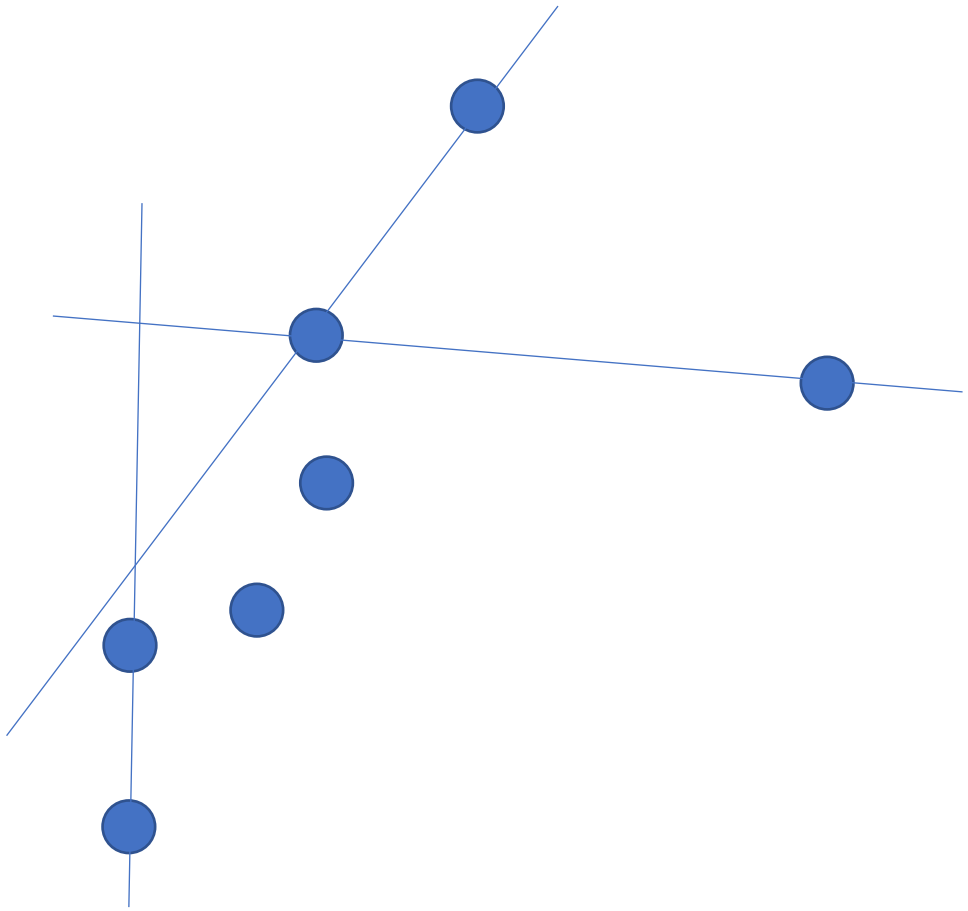


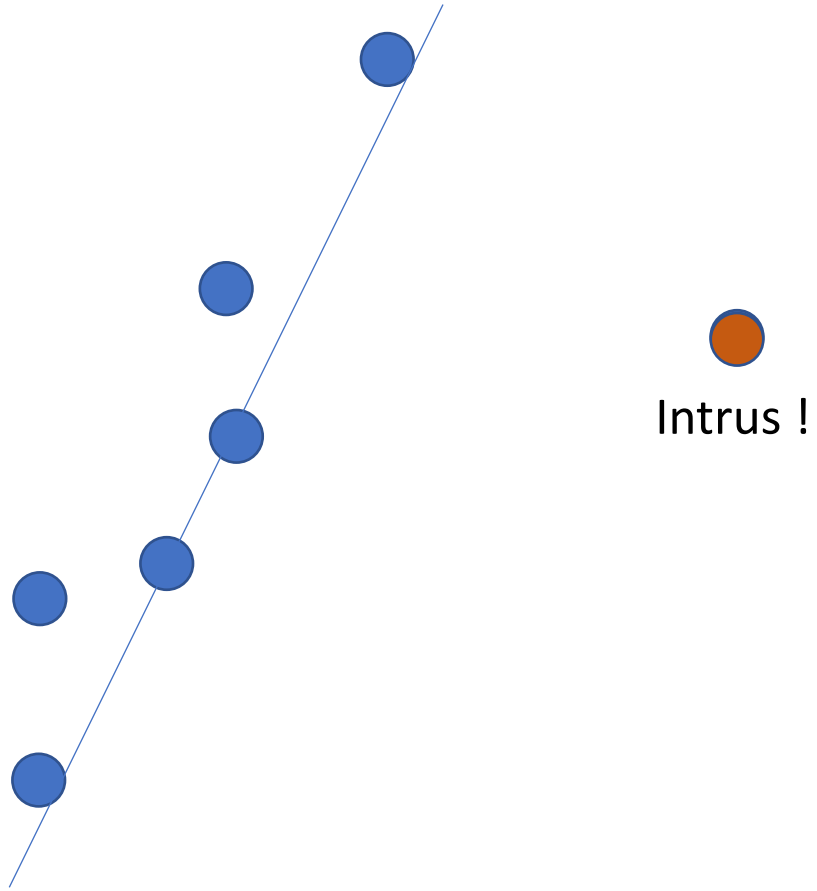
Solution approchée
(optimisation)



Solution biaisée

RANSAC



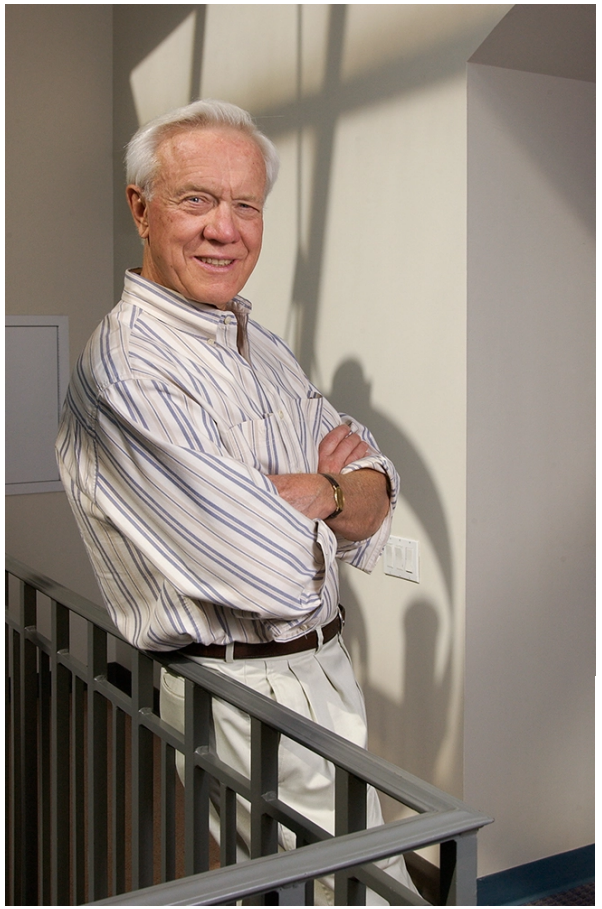


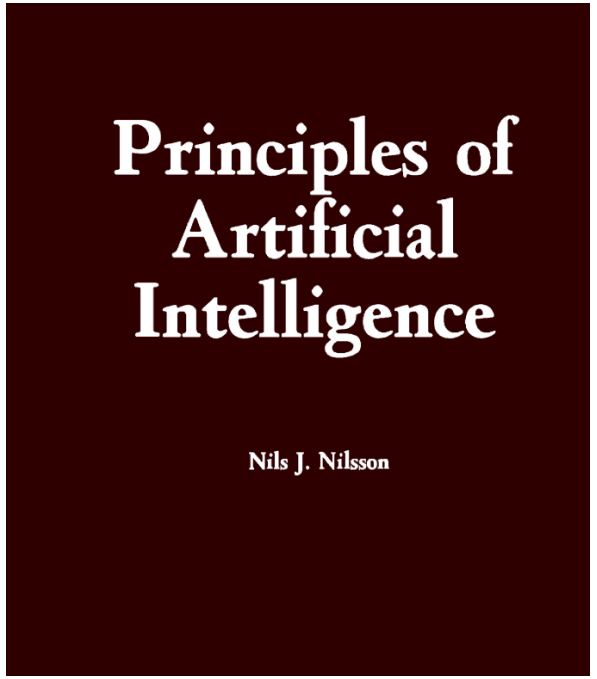
Pourquoi ce succès ?

- Les données contiennent des erreurs…
- Concept simple et intuitif : on fait des hypothèses et on les vérifie.
- Explosion combinatoire :
  - 7 points, 2 points/modèle : 21 hypothèses
  - 1000 points, 3 points/modèle : 10^9 hypothèses (c'est beaucoup !)
- Méthodes heuristiques :
  - Stochastiques (inférence statistique)
  - Deterministes (algorithme A*)
  - …

Nils Nilsson (1933-2019)

A great scientist, a great person, a wonderful friend





[BOOK] **Principles of artificial intelligence**

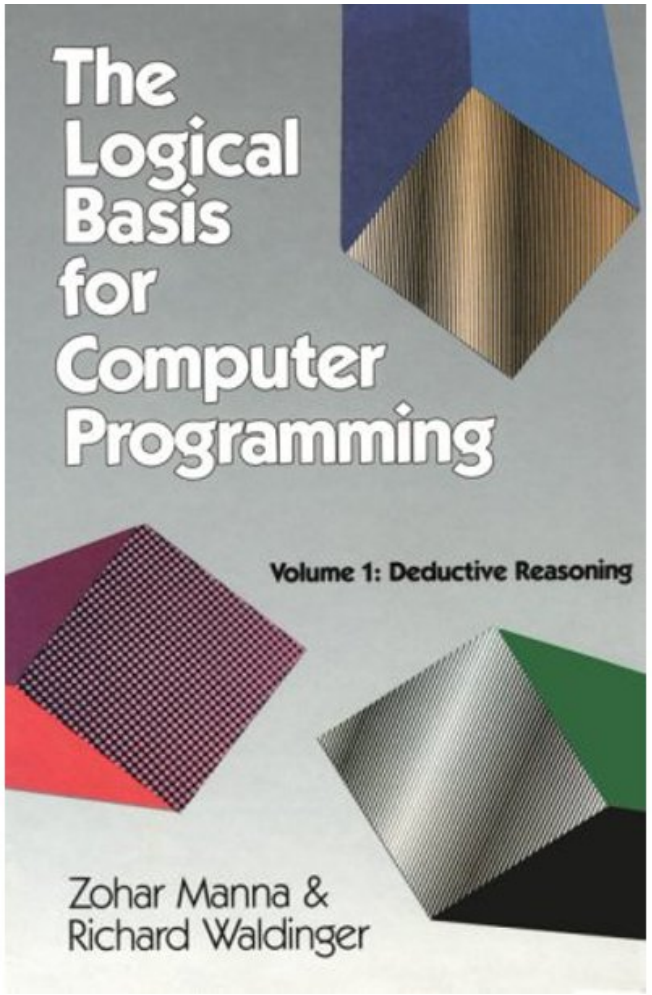
NJ Nilsson - 1982 - books.google.com

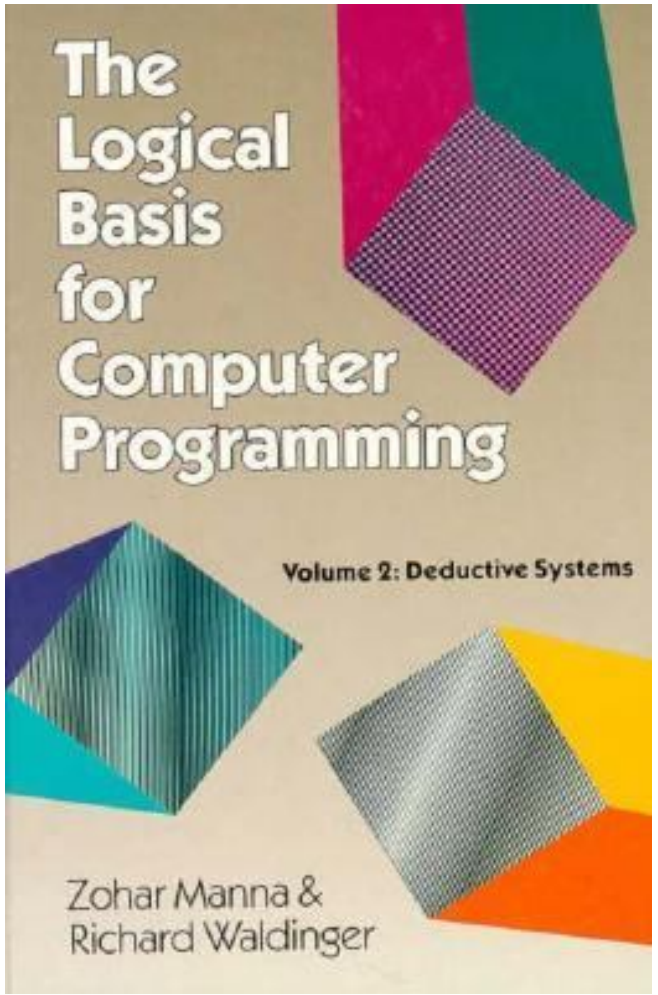
Previous treatments of **Artificial Intelligence** (AI) divide the subject into its major areas of … in my previous book, Problem solving Methods in **Artificial Intelligence**, are covered here as well, …

☆ Save 99 Cite Cited by 9193 Related articles All 16 versions

Avril 1982: Sierra High Route

Zohar Manna & Richard Waldinger





1986-1996 : chercheur au LIFIA

Les premiers doctorants

- Thomas Skordas
- Laurent Hérault
- Humberto Sossa
- Patrick Gros
- Fadi Dornaika
- Stéphane Christy
- Bart Lamiroy

Equipe VOIR/MOVI

- Roger Mohr
- Long Quan
- Françoise Veillon

Thomas Skordas, premier doctorant !

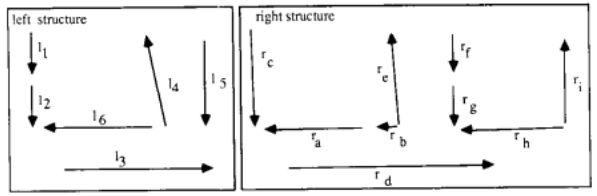


Fig. 5. Two images to be matched.

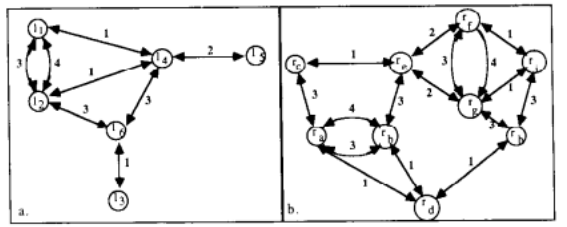


Fig. 6. Two structural descriptions to be matched. The interline relations are: left of (1), right of (2), same junction (3), and collinear (4).

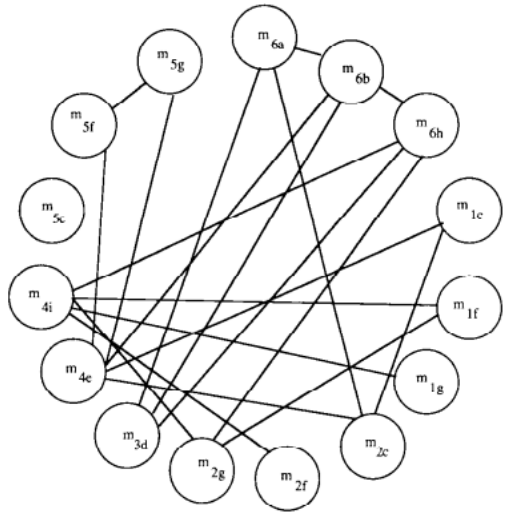
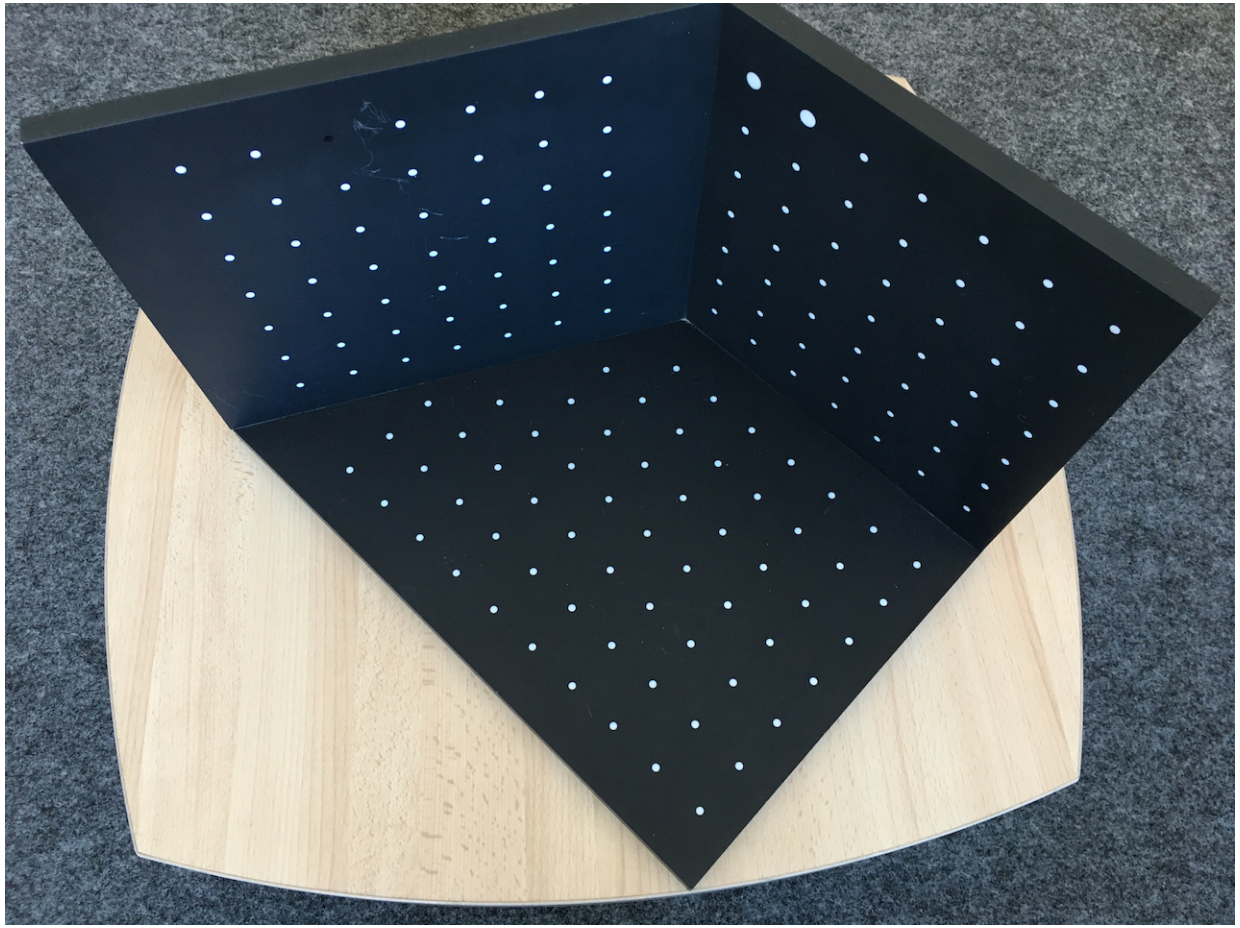


Fig. 7. The graph representation after node building and after applying the first three rules.

Roger Mohr (1947-2017)

- Enseignant, chercheur,
- Plusieurs contributions majeures en IA et vision,
- Une grande ouverture d’esprit,
- une grande générosité,
- un collaborateur précieux,
- un ami et
- un exemple à suivre

La mire à Roger



Françoise Veillon (1939-2020)

La rigueur informatique au service de la vision par ordinateur

Long QUAN, (Ph.D., INRIA, France)

Professor

Long QUAN
The Department of Computer Science and Engineering
The Hong Kong University of Science and Technology
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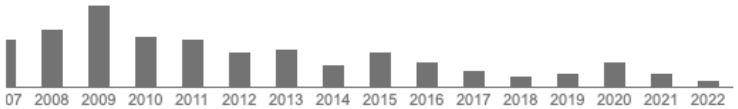
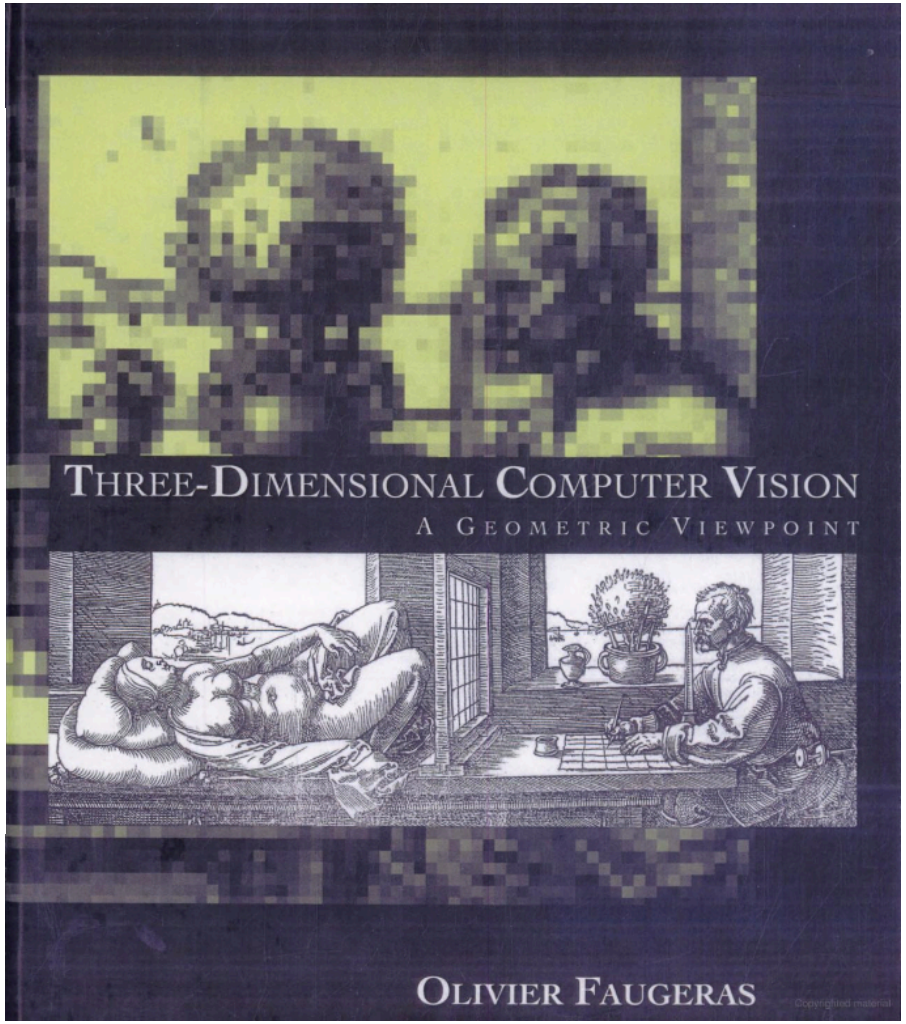
Vision 3D

Camera calibration for 3D computer vision

Authors	OD Faugeras
Publication date	1987
Journal	Proc. Of International Workshop on Industrial Application of Machine Vision and Machine Intelligence, 1987
Pages	240-247
Description	Camera Calibration for 3D Computer Vision | CiNii Research CiNii 国立情報学研究所 学術 情報ナビゲータ[サイニィ] 論文・データをさがす 大学図書館の本をさがす 日本の博士論文をさがす English 検索 タイトル 人物/団体名 所属機関 ISSN DOI 期間 ~ 本文リンク 本文リンクあり データ ソース JaLC IRDB Crossref DataCite NDL NDL-Digital IDR JDCat NINJAL CiNii Articles CiNii Books CiNii Dissertations RUDA DBpedia Nikkei BP KAKEN すべて 研究データ 論文 本 博士論文 プロジェクト [4/18更新]CiNii Articlesの CiNii Researchへの統合について Camera Calibration for 3D Computer Vision 被引用文献1件 FAUGERAS OD 収録刊行物 Proc. Of International Workshop on Industrial Application of Machine Vision and Machine Intelligence, 1987 Proc. Of International Workshop on Industrial Application of Machine Vision and Machine Intelligence, 1987 240-247, 1987 …
Total citations	Cited by 423

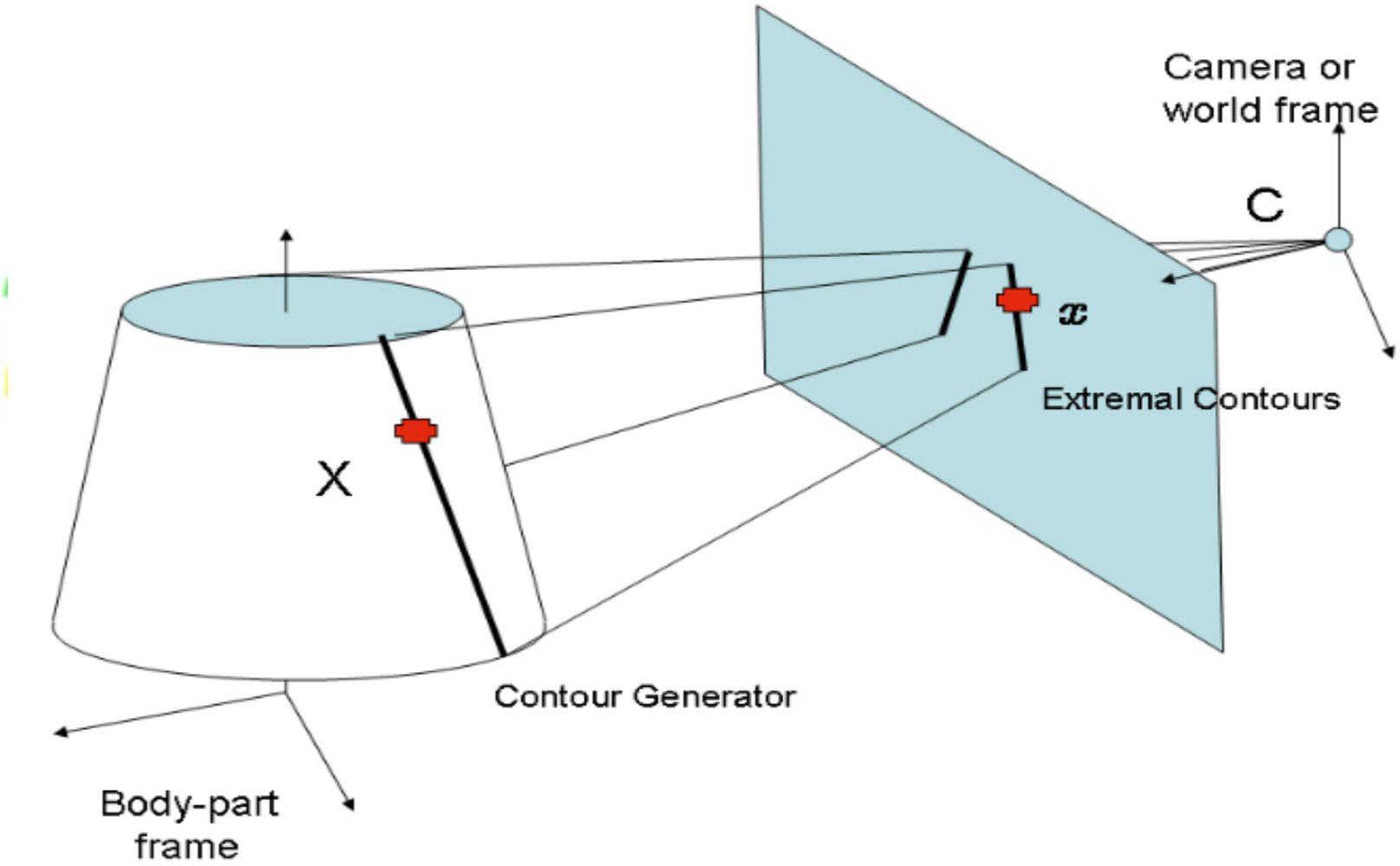




1996-2022 : Inria Montbonnot Saint-Martin

- 1996-2006 Vision et robotique
- 2006-2022 Audio, vision et robotique

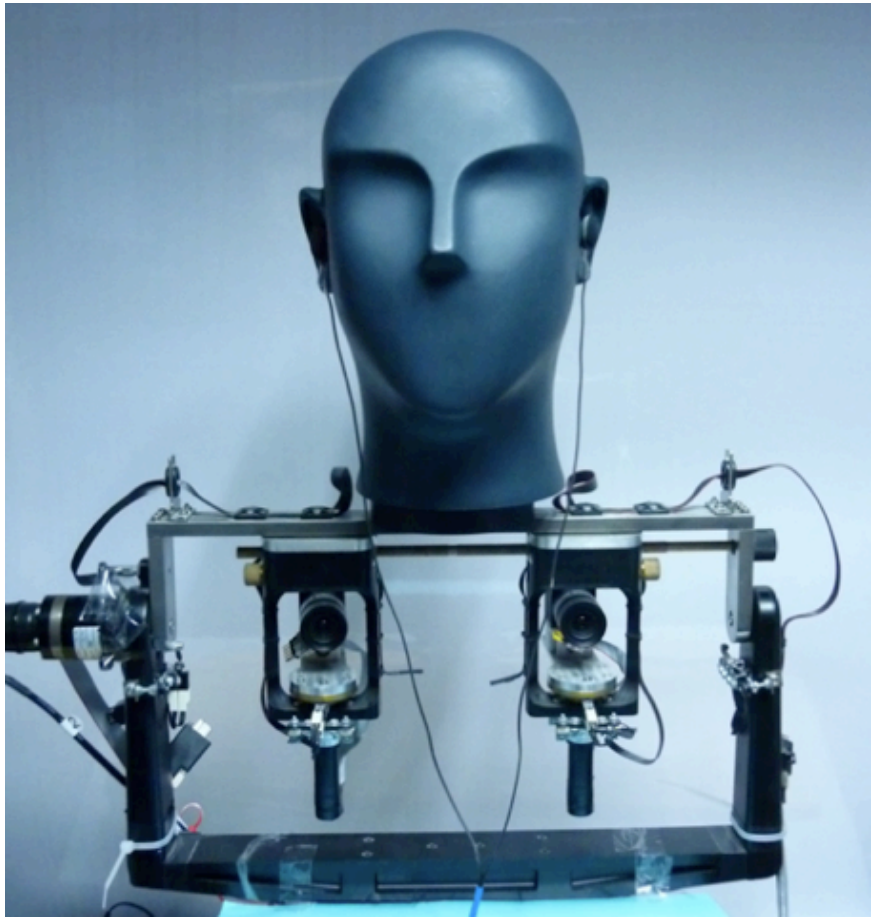
Human motion capture from extremal contours
David Knossow et al. IJCV 2008



2006-2008 Perception on Purpose (POP) (projet européen)

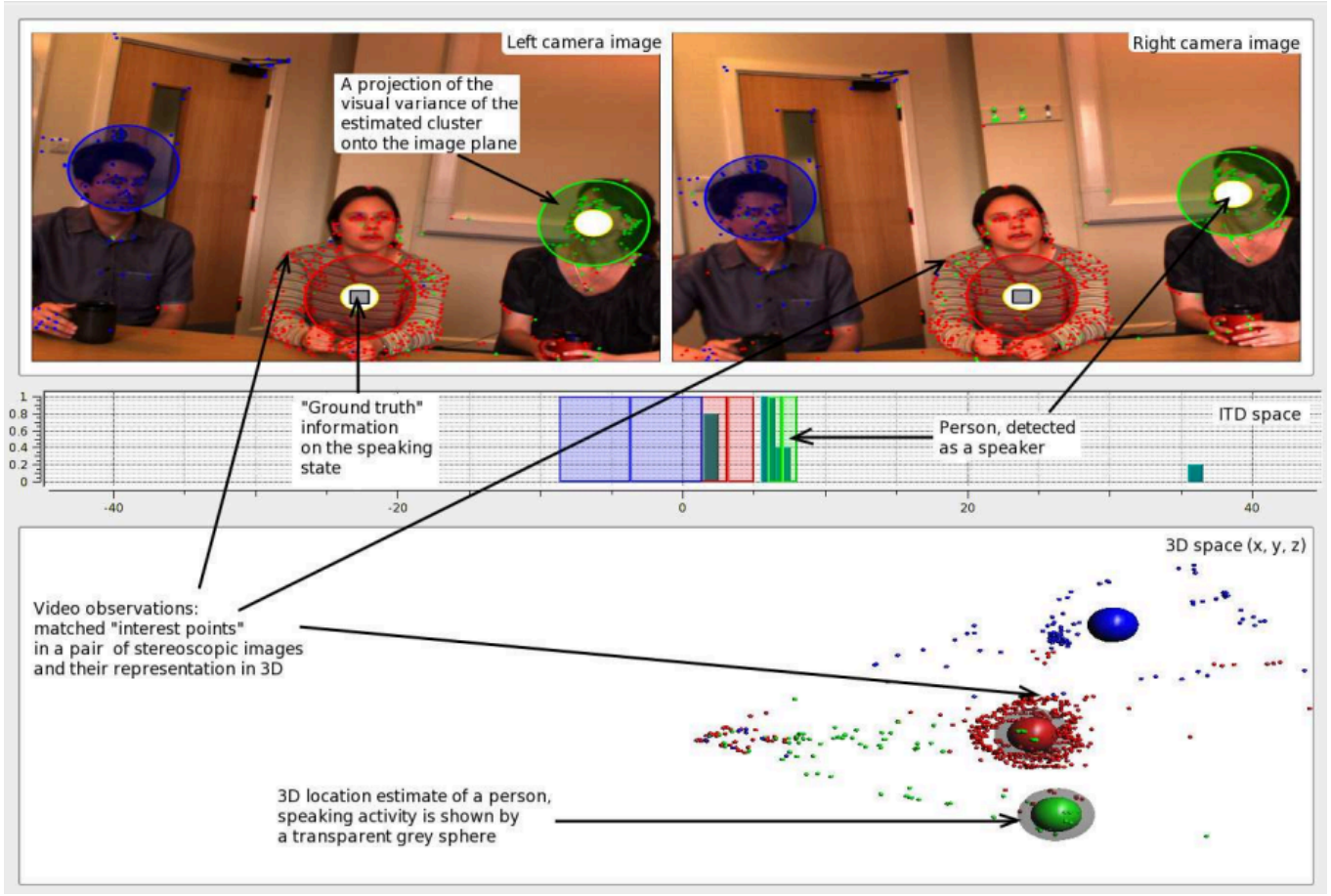
- Partenaires :
  - Inria, computer vision, statistics
  - U Hamburg, neurophysiology
  - U. Coimbra, robotics
  - U Sheffield, audio and speech
  - U Osnabrück, cognition
- Equipe Inria :
  - Elise Arnaud
  - Ramia Narasimha
  - Elise Taillant
  - Florence Forbes
  - Vasil Khalidov
  - Miles Hansard
  - Bertrand Holveck
  - Radu Horaud

Popeye



Audio-visual clustering

Vasil Khalidov, Elise Arnaud, Florence Forbes,
Miles Hansard & Radu Horaud



Qu’est qu’un projet de recherche ?

Professor Sir Michael Brady

- Avant 1985 : MIT, Boston, USA
- Depuis 1985 : Oxford University

1989 : Premier projet européen (FIRST – Fundamentals in Intelligent Robotic Systems), cinq partenaires (Grande Bretagne, Italie, Allemagne, Belgique, France), 1.5 M Ecus.

Pourquoi un projet européen ?

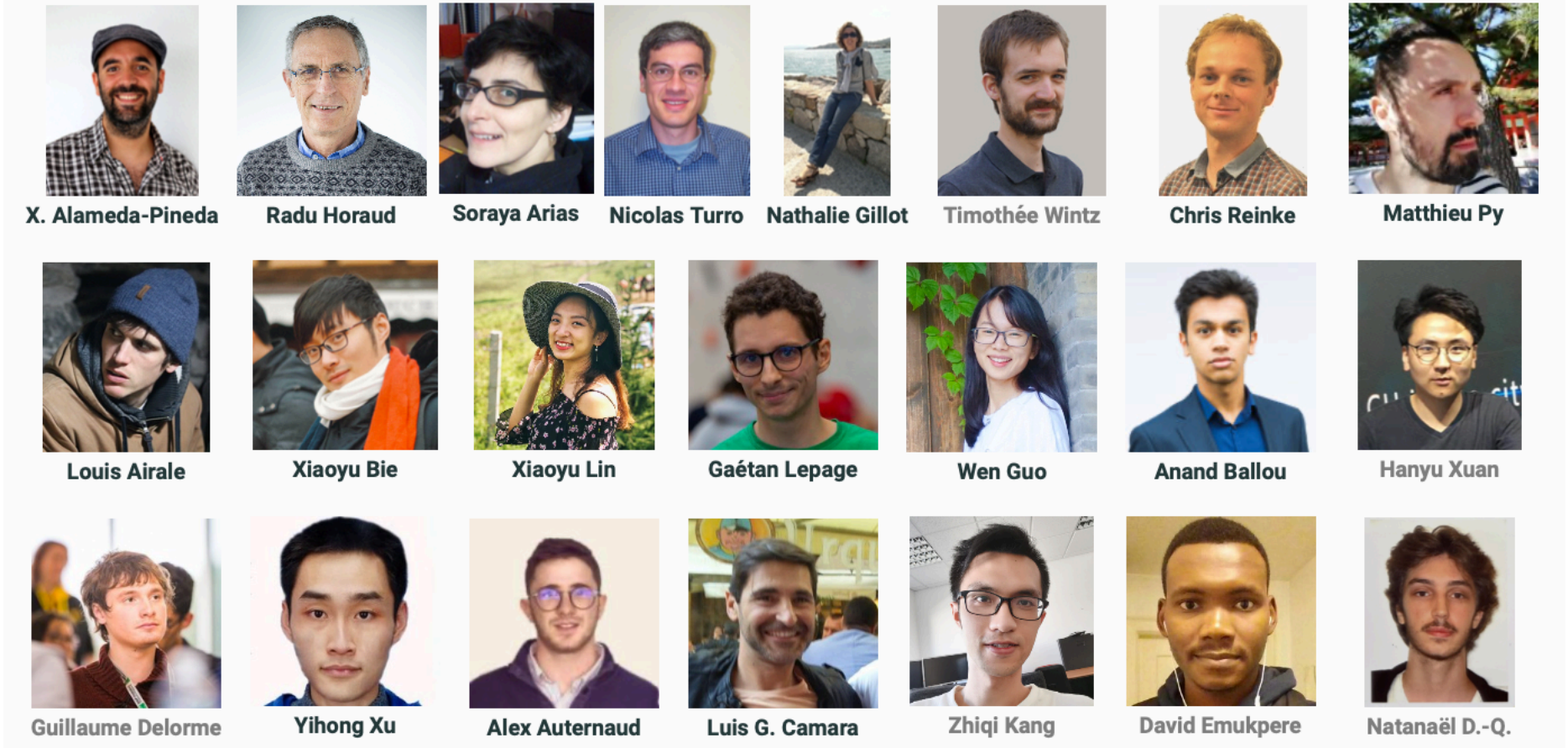
- Echanges scientifiques entre plusieurs équipes
- Collaborations interdisciplinaires
- Financement confortable sur 3-5 ans
- ***Mais :*** difficile à obtenir, gestion administrative/financière

« *Man, you told me if I think pennies, I get pennies, I'm thinking dollars, man* » (Ray Charles)

2010-2022 : L’état de grâce

- 2010-2013 Humanoids with audio-visual abilities in populated spaces
- 2014-2016 Embodied audition for robots
- 2014-2019 Vision and hearing in action
- 2018-2019 Vision and hearing in action laboratory
- 2020-2023 Socially pertinent robots in gerontological healthcare

Equipe RobotLearn, janvier 2022



Un grand merci ! (liste incomplète)

- Catherine Rapin, Marie Lorphelin, Fanny Rosseti, Mounir Bareche
- Soraya Arias, Roger Pissard-Gibollet, Nicolas Turro, Hervé Mathieu
- Léa Jeandet, Aurélia Mouton, Madeleine Zalkind, Gaëlle Rivérieux
- Les services généraux
- Le service des moyens informatiques
- Les membres du comité des projets
- Les directeurs du centre : Jean-Pierre Verjus, Bernard Espiau, François Sillion, Patrick Gros, Frédéric Desprez
- Danielle Herzog, Anne Pasteur, Christine Krebs, Nathalie Gillot
- La direction des ressources humaines d'Inria

A chacun son Everest

« *For me, Everest was not an end, but a beginning* »
(Sir Edmund Hillary)