

Master M1

Image



Responsable: Frank NIELSEN

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Master M1

Image

4 cours, 2 Automne + 2 Printemps :

INF555 Fondements de la 3D

Fundamentals of 3D processing

INF552 Vision et Réalité Augmentée

Computer vision and augmented reality

Printemps
2009



INF562 Algorithmes géométrique

Computational geometry

INF584 Infographie temps reel

Real-time graphics

Modules de 36h:

- 9 cours
- 9 TDs (sur PCs, C++, OpenGL)



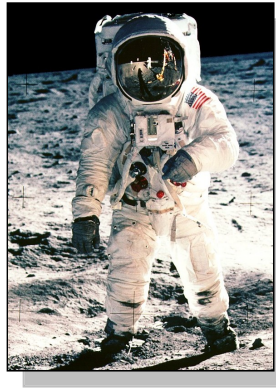
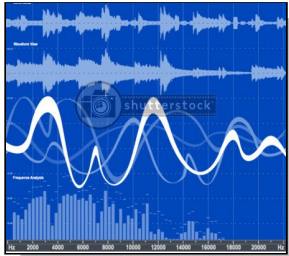
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Image

Le monde est devenu **numérique** :

- Dissociation du *contenu* et de son *support*
- Algorithmes *génériques* et *traitements efficaces*

On est ici
3D TV
201X ?



70 son 80 image 90 video 00 + géométrie

Sciences de l'Infovissuel :
Visual computing

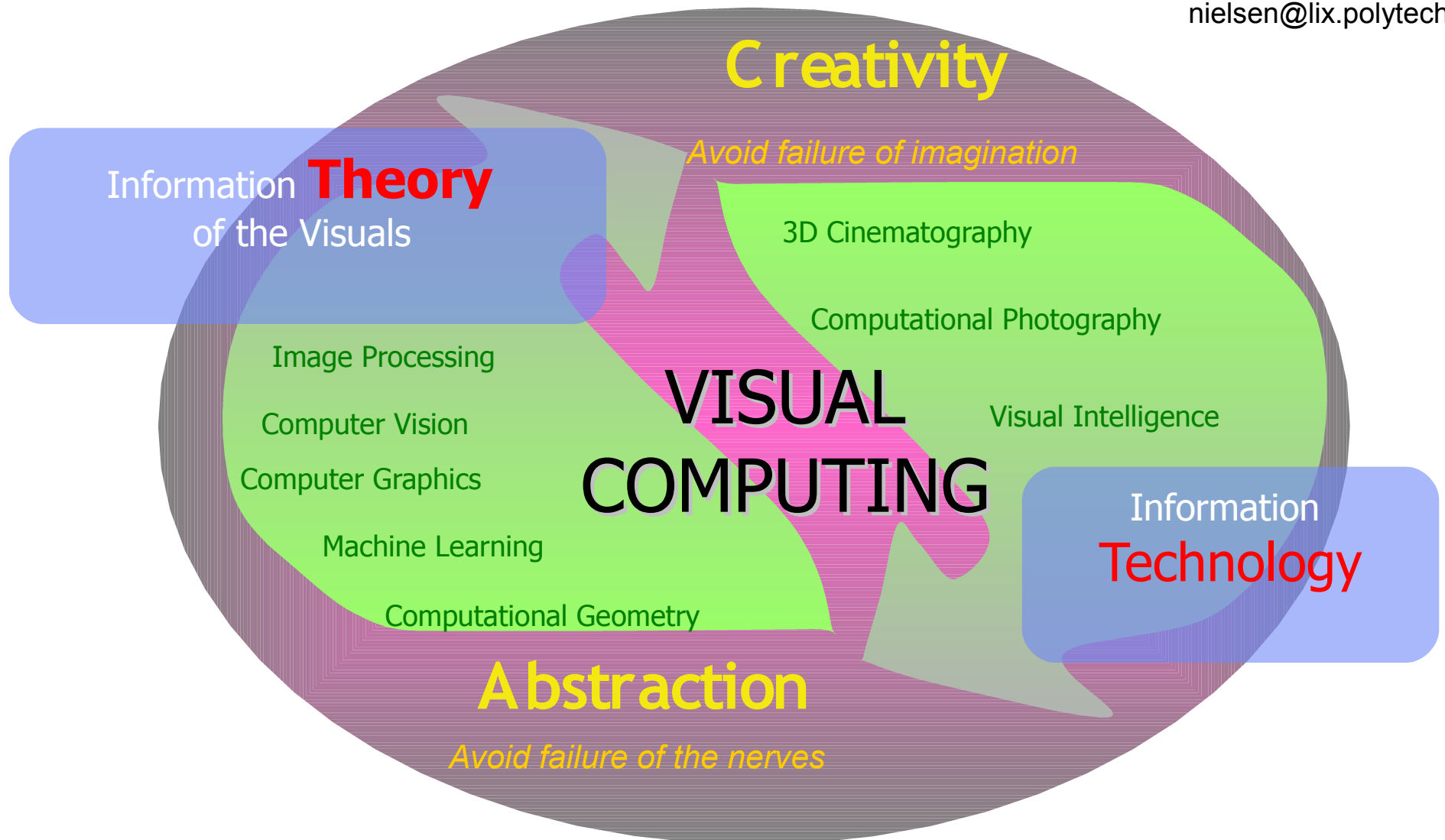
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INF555 Fondements de la 3D



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>> **Bases solides** et *synergies* du traitement infovisuel



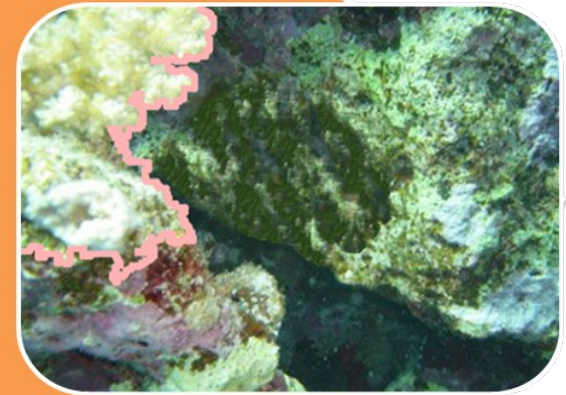
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Image

INF555 Fondements de la 3D

Basics of the cross-disciplinary image curriculum with applications

ClickRemoval system:



<http://www.sonycl.co.jp/person/nielsen/ClickRemoval/>

INF555 Fondements de la 3D

Lectures are illustrated with **numerous creative applications**



(a) 400 millions of pixels (400-MP)

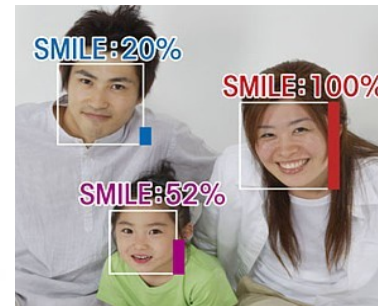
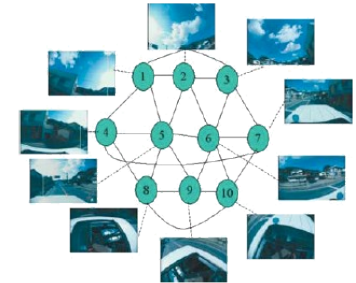
(b)



(c) source picture (5-MP)

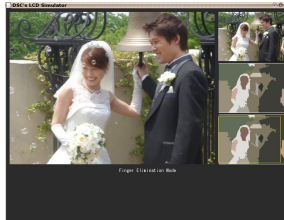


(d) source picture (5-MP)

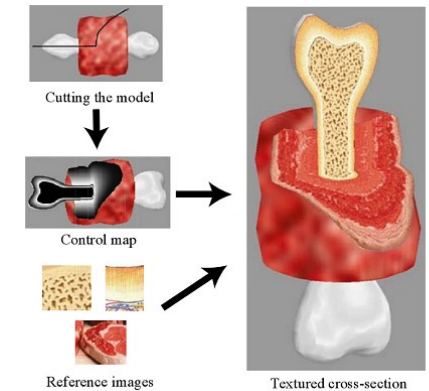


3D Cinematography

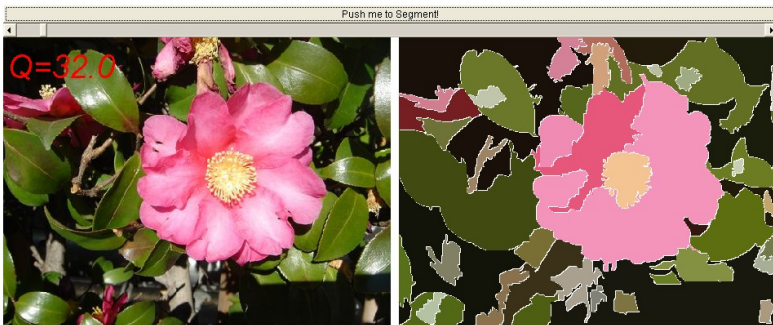
Computational Photography



Visual Intelligence

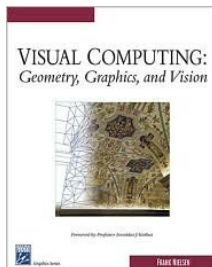


Novel 3D volume graphics



INF555 Fondements de la 3D

- Lecture 1: Abstract data structures
- Lecture 2: *Basics of coordinate pipelines*
- Lecture 3: Advanced coordinate pipelines
- Lecture 4: Images: Morphing, Interpolating, etc.
- Lecture 5: Maillages
- Lecture 6: Animation
- Lecture 7: Randomization
- Lecture 8: Higher dimensions for 3D
- Lecture 9: Robustness



Le cours repose sur l'ouvrage:
Visual Computing: Geometry, Graphics and Vision,
F. Nielsen, 2005.



<http://www.sonycs1.co.jp/person/nielsen/visualcomputing/>

Web supplements

Click on the chapter links below to access the C++ programs and web supplements or [here](#) to get all source listings.
All GLUT/OpenGL(R) source codes are soon available with comments on this [web page](#).

Foreword by Prof. L. J. Gibson

1. Overview
2. Abstract Data Structures
3. Coordinate Pipelines
4. Images
5. Meshes
6. Animation

7. Randomization
8. Higher Dimensions for 3D
9. Robustness

Bibliography in PDF

View all source codes at once

Note for compiling programs

All Windows(R) sites in a Zip file
(for some pages you need to download source data)

Click on the chapter links on the left frame to access C++ programs and web supplements or [here](#) to get all source listings.

All GLUT/OpenGL(R) source codes are soon available with comments on this [web page](#).

If you wish to receive further information concerning major updates of this site, you can register your email address:

Your E-mail:

Visual Computing: Geometry, Graphics, and Vision.

Frank Nielsen, Charles River Media / Thomson Delmar Learning, August 2005.

ISBN: 1-58450-427-7, Retail price 59.95 USD (currently discounted at [Amazon.com](#) at 35 USD, as of August 23rd 2005)

Hard cover, xiv+569 pages, 8-page color insert, 50+ C++ source codes (some in OpenGL)

Rationale: [\(Information Tip Sheet\)](#)

Visual Computing: Geometry, Graphics, and Vision is a concise introduction to common notions, methodologies, data structures and algorithmic techniques arising in the mature fields of computer graphics, computer vision, and computational geometry. The central goal of the book is to provide a global and unified view of the rich interdisciplinary visual computing field that encompasses traditional computer graphics, computer vision, and computational geometry. The book is targeted at undergraduate students, and gaming or graphics professionals. Letters in computer graphics/vision may find this textbook complementary and valuable. The book aims at broadening and fostering readers' knowledge of essential 3D techniques by providing a readable overall picture and describing essential concepts. Throughout the book, appropriate real world applications are covered to illustrate the use and generate an interest in adjacent fields. The book also provides concise C++ codes for common tasks that should be compelling to a broad audience of practitioners.

Table of Contents [\(TOC in PDF\)](#)

Official Web site including source codes, related materials and list of errata or corrections:

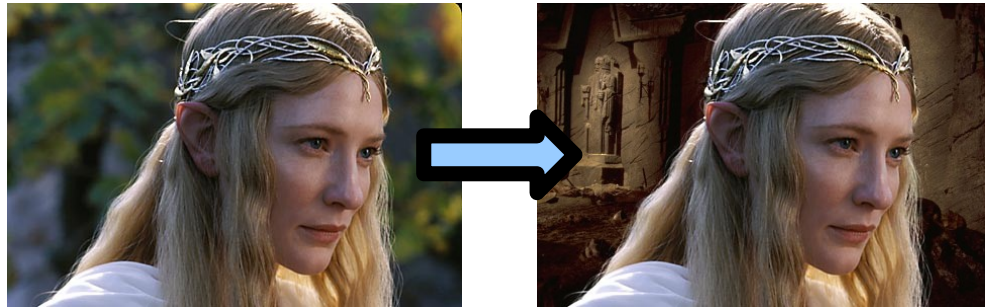
Foreword by Prof. L. J. Gibson

Home Page of Charles River Media / Thomson Delmar Learning, Inc.

INF552 Vision et Réalité Augmentée



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Digital matting



Image interpolation



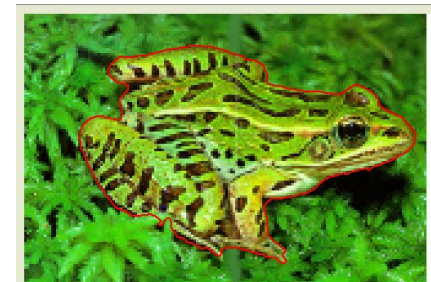
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Photomontage

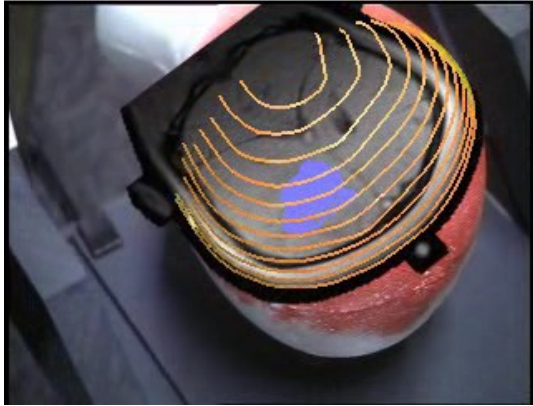


2D vision



Optimal segmentation

INF552 Vision et **Réalité Augmentée**



Online



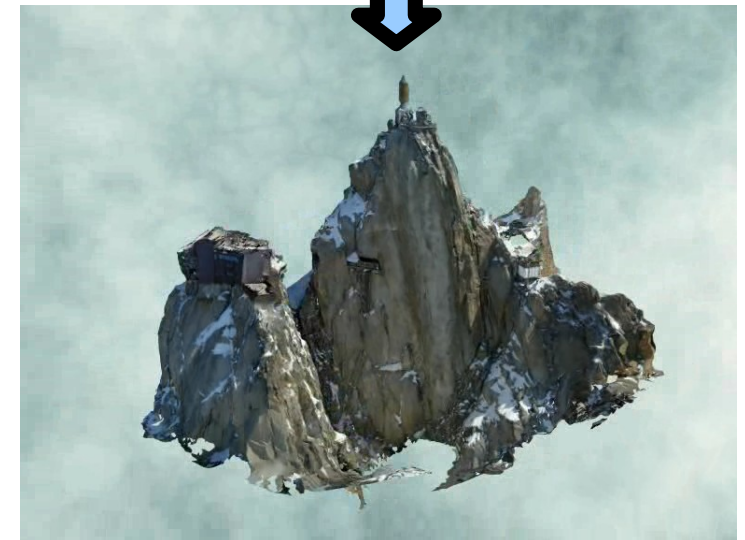
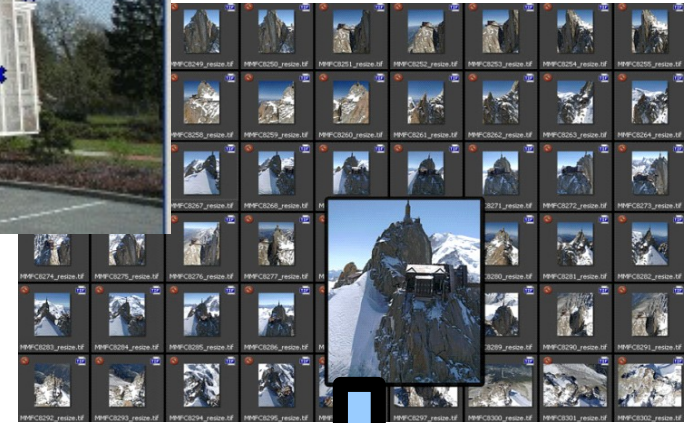
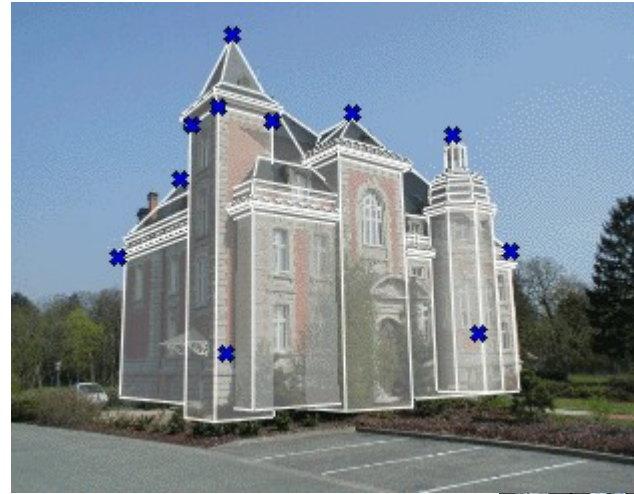
Offline

3D augmentation



INF552 Vision et Réalité Augmentée

3D photography



3D modeling



Motion capture



INF552 Vision et Réalité Augmentée

PLAN

- 1) Montage numérique 2D
- 2) Méthodes optimales: modèles discrets contre modèles continus
- 3) Connaissances a priori
- 4) Géométrie des caméras
- 5) Vision du relief
- 6) Acquisition de modèles tridimensionnels I: géométrie
- 7) Acquisition de modèles tridimensionnels II: textures
- 8) Acquisition de modèles tridimensionnels III: mouvement
- 9) Incrustation d'objets 3D

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INF584 Infographie temps réel



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Cinéma



Jeux vidéos



CAO / CFAO



Architecture

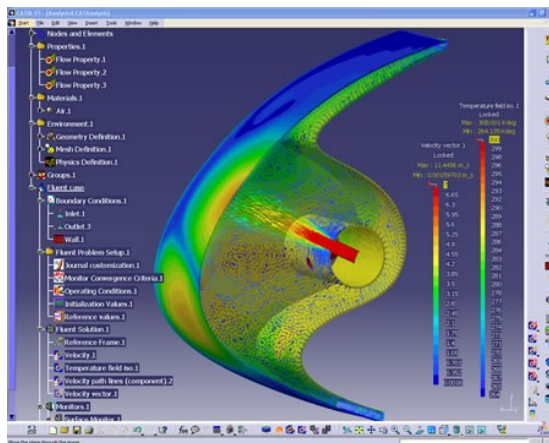
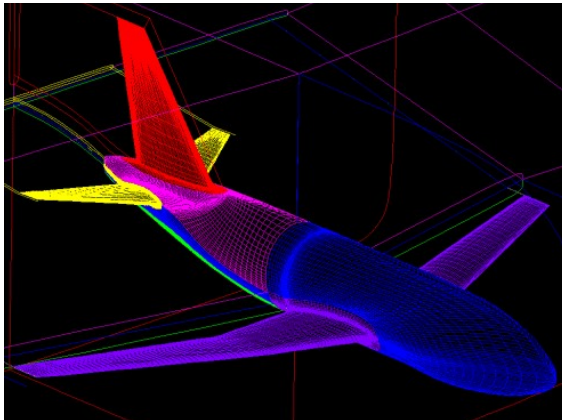
INF584 Infographie temps reel

La géométrie numérique



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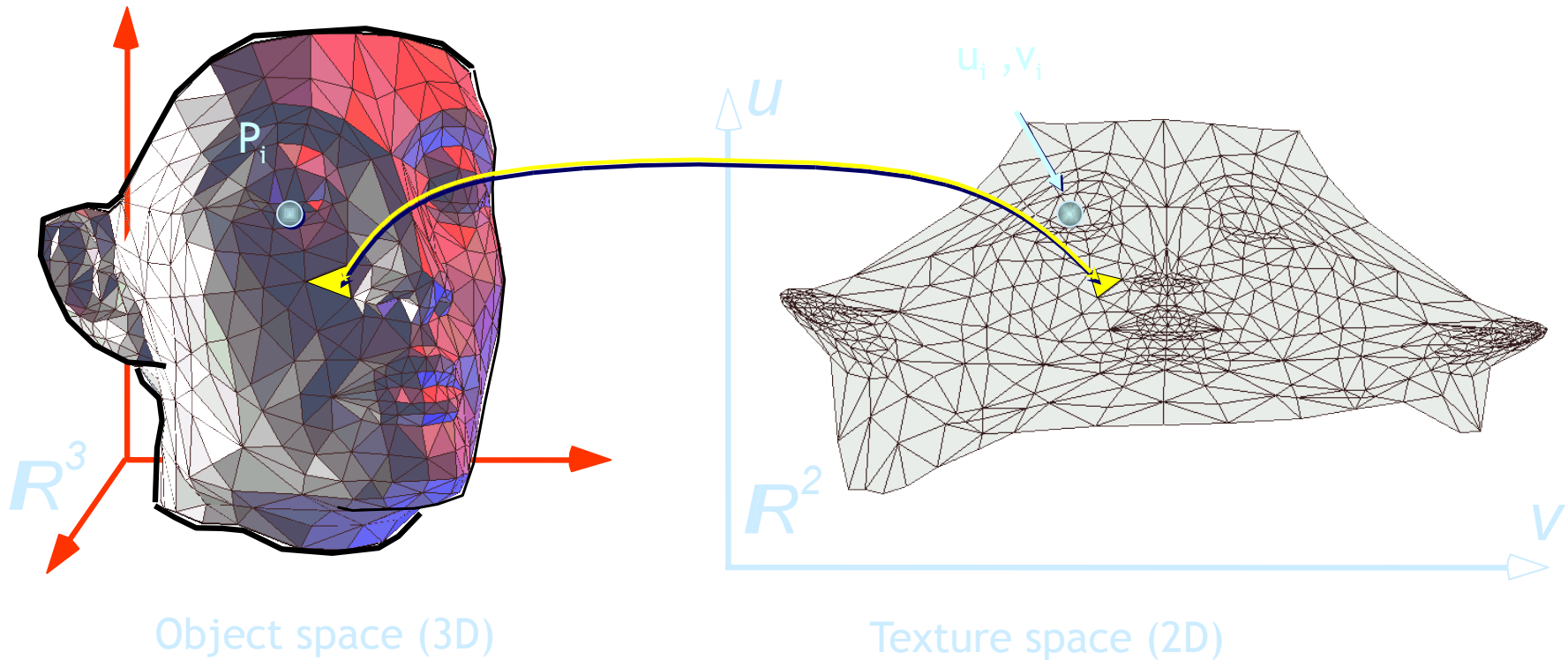
Design
Simulation

Assembly
Maintenance

Beaucoup d'activités
autour du produit

INF584 Infographie temps réel

Les maillages :

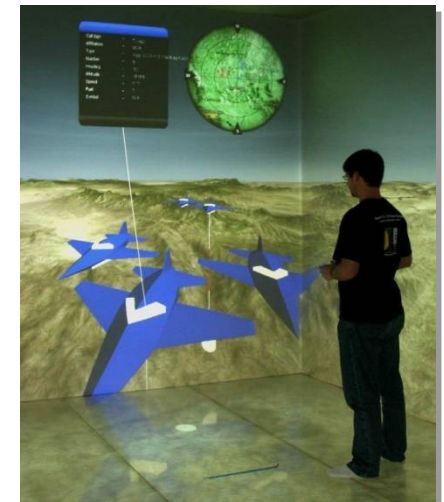


Parameterization:

Du Continu au Discret...

INF584 Infographie temps réel

- Cours 1: Maillages
- Cours 2: *Shading*
- Cours 3: Sous le capot
- Cours 4: Questions de visibilité
- Cours 6: Le côté obscur de la Force (ombres)
- Cours 5: Ni trop, ni trop peu (niveaux de détails)
- Cours 7: Animations de personnages
- Cours 8: Simulation physique
- Cours 9: Rendu expressif



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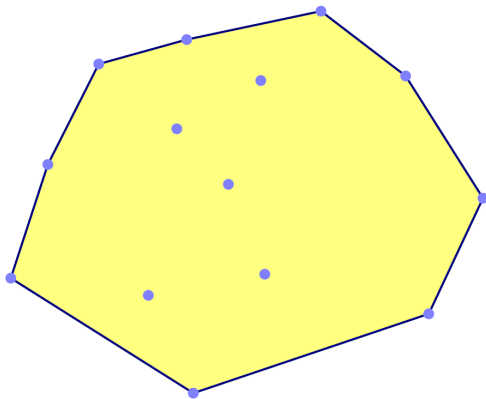
INF562 Algorithmes géométriques



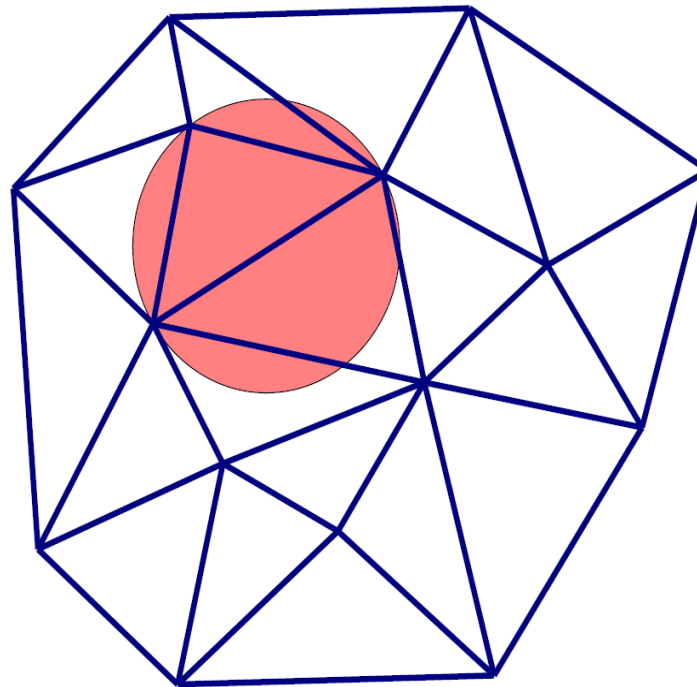
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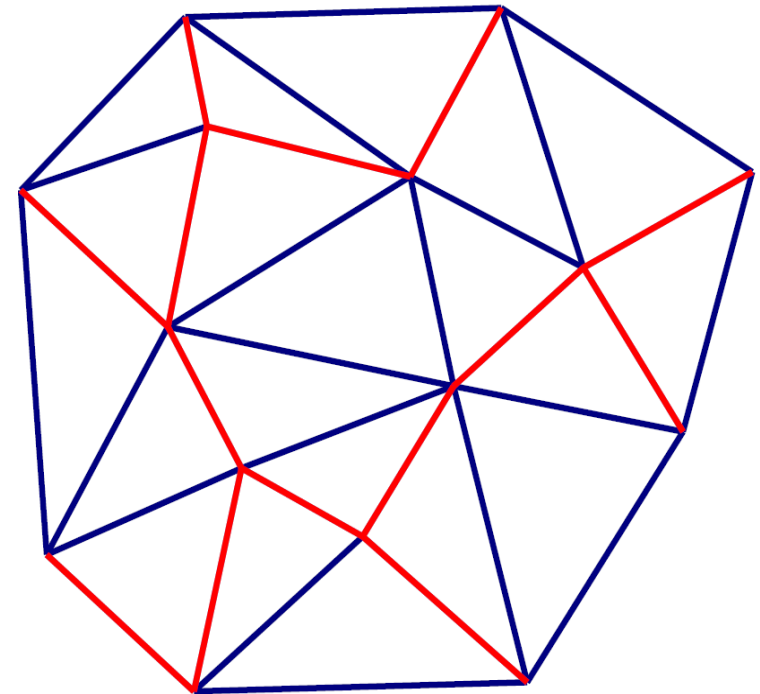
Algorithmes géométriques fondamentaux:
programmation (C++) et **applications**



Enveloppe convexe



Triangulation de Delaunay



Arbre recouvrant de poids minimal

INF562 Algorithmes géométriques



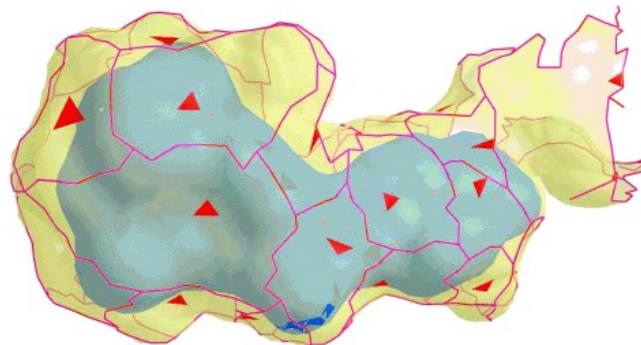
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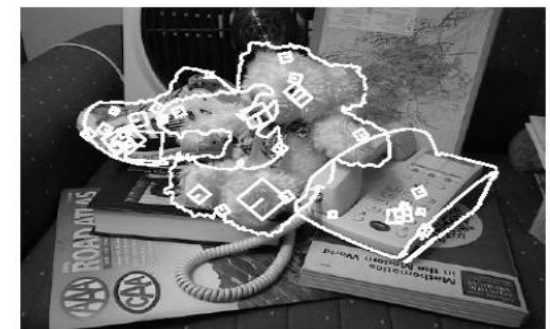
La géométrie algorithmique a de nombreuses applications industrielles :
Puisque les algorithmes sont *efficaces* et *stables*: **enabling technology**.



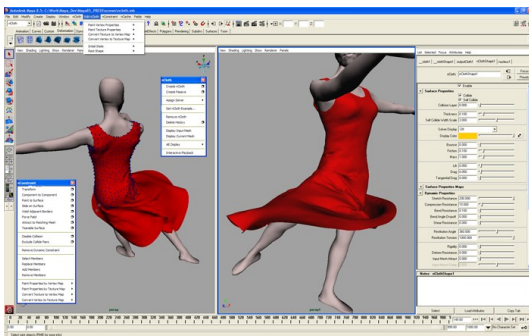
CAD (Catia/Dassault)



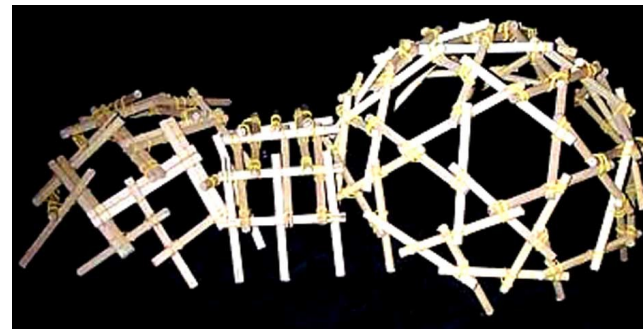
Molecular docking



Reconnaissance de formes

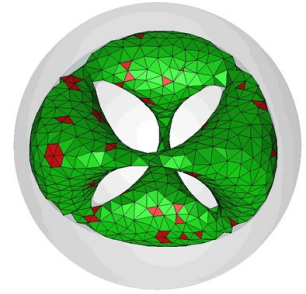


3D CAD Maya animation



Architecture

INF562 Algorithmes géométriques





- Cours 1: Introduction / Enveloppes convexes / CGAL (C++)
- Cours 2: Triangulation de Delaunay, premier algorithme
- Cours 3: Delaunay, les grands classiques
- Cours 4: Randomisation
- Cours 5: Problèmes de robustesse (precision numerique)
- Cours 6: Generalisations (puissance, contraint. . .)
- Cours 7: Application : reconstruction
- Cours 8: Application : maillage
- Cours 9: Autres problemes en geometrie algorithmique

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Automne 2008 :

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Printemps 2009 :

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Merci et à bientôt !