INRIA - NKUA Meeting
Follow-up of INRIA visit to Athens, May 2010

Ioannis Emiris

Outline
Bilateral agreement * Department of Informatics & Telecoms
* Theory division * Algebraic/Geometric computing
National & Kapodistrian University of Athens and INRIA Sophia-Antipolis

- Several point-to-point contacts
- Partner of INRIA International Internships

- Bilateral agreement (Fall 2010)
- Coordinator: I. Emiris,
  Deputy coordinator: D. Thilikos (Math)
- Activities:
  * Exchange of academic personnel
  * Student exchange
  * Exchange of non-academic personnel, in specific circumstances
  * Joint research activities (bilateral, regional/European framework)
  * Exchange of good practices (e.g., joint software development, innovation practices)
Part of the School of Natural Sciences


42 Faculty

According to the 3 ARWU Shangai rankings, in the top 75-100 CS departments world-wide.

3 IEEE Fellows, one ACM Fellow, 3 ERC Ideas Startup grants
10 faculty
2 ERC Startup Grants (Probabilistic algorithms, Crypto/security)

14 PhD students (mostly European funding)
12 Postdocs / Collaborators
Research areas

Game theory, randomized algorithms, E. Koutsoupias, D. Achlioptas

Combinatorial optimization, V. Zissimopoulos, S. Kolliopoulos

Theory of programming languages, P. Rondogiannis

Cryptography/Security, A. Kiayias

Scientific computing, N. Misirlis, F. Tzaferis

Graphics/Biometrics, T. Theoharis

Algebraic/geometric computing, I. Emiris
Lab of Algebraic & Geometric algorithms

ЕρΓΑ: erga.di.uoa.gr

People:
1 faculty, 3 affiliated Profs/researchers
3 PhD students, 2 Postdocs
+ collaboration with GALAAD (ex-Associated team)

Current Projects:
SAGA: ShApes, Geometry, Algebra (Marie Curie Net)
CGL: Computational Geometric learning (FET-Open)
Θαλής: Geometric computing (Greek ministry)
Algebraic computing

Polynomial system solving via Resultant matrices
Implementation in Maple, C
Structured matrices [E-Mourrain-Pan]

Sparse elimination theory
Newton polytope, Sparse resultant, mixed volume
[Canny-E,J.ACM'00]

Real solving, fast implementation (Synaps)
Competitive to numeric solvers
[Tsigaridas-E,TCS'08]
Expected complexity, Systems, optimization
[E-Galligo-Mourrain-Tsigaridas,ISSAC'10]
Geometric computing

Nonlinear Computational geometry
Voronoi diagrams, arrangements
Ellipses in real time (CGAL/Synaps, 1sec/ellipse)
[E-Karavelas, SODA'03], [E-Tzoumas, SPM'07, '09]

Newton polytope of resultant, up to 10 dim
Output sensitive approach, CGAL code
[E-Fiskopoulou]
Reduce implicitization to linear algebra

High-dim search, Approximate Nearest neighbors
Adaptive data-structures [E-Malamatos-Tsigaridas]
Kinematics

Parallel robot calibration [Daney-E, ICRA'01]
Hybrid platform for physiotherapy
[E-Daney-Sirseloudis'11]
Sparse polynomial systems

Rigidity, Distance matrices, PSD matrices
[E-Mourrain, Algorithmica'99]
Embeddings of 11-bar mechanism [IFTOMM'11]

Structure from NMR
Transmembrane proteins
Pharmacophores, docking [E-Manocha-Fritzilas'06]