NuHAG *Faculty Mathematics, Univ. Vienna*

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Brno: Signal Processing Workshop 2011
talk delivered October 27th, 2011

NuHAG History

- Started around 1992, with a priority program on image processing (1992-2000);
- based on long-standing work in *abstract harmonic analysis* and *openness* for applications; topic: **irregular sampling**;
- founding trio: Hans G. Feichtinger, Karlheinz Gröchenig and Thomas Strohmer;
- books on **Gabor analysis** (F/St): 1998 and 2003, and TF-analysis (K.Gr.) 2001;
- last decade: cooperation with communication engineers, astronomers, medicine, mechanical engineering, etc.;
- 2005-2009: EUCETIFA (Marie Curie Excellence Project): A European Center for Time-frequency Analysis.

NuHAG Recent Projects

- **EUCETIFA** (2005-2009): European Center for TF-Analysis;
- a series of Individual Marie Curie Fellowships: Fornasier, Czaja, Rauhut, Marelli, Heineken, Pap, Luef, ... ;
- **MOHAWI** (Modern Harmonic Analysis for Wireless Communication, 2006-2009); resulting in patents;
- **ESO** (European Southern Observatories), 2009-2012;
- **WWTF** projects by Peter Balazs and Monika Dörfler;
- **SISE** (FWF priority program): 2009-2014;
- **UnlocX** (EU-project, with companies): Uncertainty and Localization; 2010-2012;
- **ESI** : upcoming special semester on TF-analysis (Sept.-Dec. 2012);

AskNu $:=$ Administrators Swiss Knife (by NuHAG)

The functioning of NuHAG is based on years of hard work and a
backbone of *infrastructure* (developed by Harald Schwab):

- Web based information system: www.nuhag.eu
- extensive local library (> 1000 books);
- this gives high visibility (members, publications, projects, huge
  bibliography, talks, NuHAG scheduler, registration, etc.);
- an extensive MATLAB repository;
- an extensive joint LATEX macro-set;
- including project and student administration tools,
  personnel planning, refunding etc. ;
- support by the (faculty) project management team;
- conference/workshop organization tools;

Experiences of the past decades

- cooperation with applied sciences and engineers typically takes a long time, but is worthwhile for *both sides*;
- one has to be *well organized* and *well connected* in order to survive the different competitions and administrative requirements (submissions, project admin, reporting);
- doing *good research* is the basis for progress, but it is demanding, often interdisciplinarity requires special efforts;
- *real progress* occurs typically when both sides are satisfies, e.g. an algorithm which is really solving the problem (or solving it much faster), and a theoretical justification, providing a guaranteed rate of convergence (worst case analysis);

NuHAG History III

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How we see ourselves

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- we see ourselves mostly as *application oriented mathematicians*
    1. Charly: Providing theory with potential relevance for applications;
    2. Franz Luef: telling non-comm. geometry people about the connections to signal processing;
    3. hgfei: moving between numerical implementation, theory and applications and make NuHAG work as a group;

- try to develop new methods and applications in cooperation with the applied scientists;

- provide young researchers and students a chance to *learn*; training by research;

Further Information

The talk manager

There is a huge amount of material available in the internet, mostly via www.nuhag.eu, but specifically through the TALK manager http://www.univie.ac.at/nuhag-php/nuhag_talks/ E.g. slides for/from the final event of EUCETIFA at IST (Institute of Science and Technology, Austria, Klosterneuburg):

www.ist.ac.at

www.univie.ac.at/nuhag-php/dateien/talks/1458_eucetifafei.pdf

Conference supported so far

http://www.univie.ac.at/nuhag-php/references/

The task of mathematicians

CLAIM: The world is getting more and more complex (think of the financial system, the interaction of drugs, the design of new materials, etc.).

POLITICIANS say: We need simple answers!

We say: We need experts on complexity, i.e. **mathematicians** who help us (the world) to break down the complexity to understandable, realizable, computable, verifyable subproblems, at lost *more and more, step by step* . . . .

Practically we can do it by providing/developping *good new concept* and principles, which are also helping to carry out computations efficiently, to optimize algorithms and to stay on top of things.
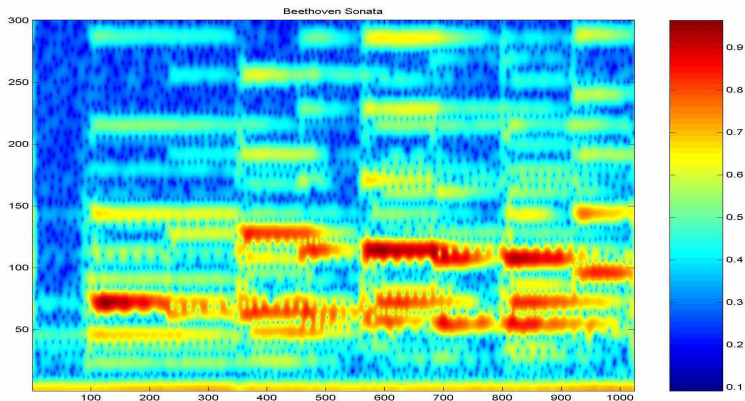
All the best for the workshop!!

Let us learn from each other!

Beethoven's piano sonata

Let us also **listen** to some (other) music and start $STX^T M$ (ARI, Vienna) or simple the Wavplayer! (Visualization via fire or water!).