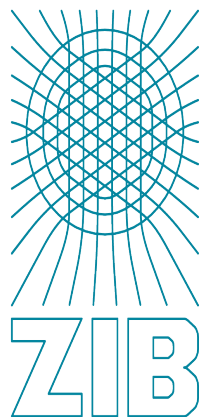# ACA 2016, Kassel
Aug 1, 2016

Hagen Chrapary, Winfried Neun

FIZ Karlsruhe and ZIB Berlin

The swMATH service for mathematical Software: state of the art and perspectives

FIZ Karlsruhe

Advancing Science

Leibniz Institute for Information Infrastructure

swMATH

- swMATH is an Open Source portal for information on mathematical Software

- Independent and comprehensive

- Started 5 years ago and has collected a lot of references to software

- A project of Zentralblatt Math / FIZ Karlsruhe supported by MODAL Research Campus

We learned about Lambert ω

- Johann Heinrich Lambert (* 26. August 1728 in Mülhausen (Alcase);
- † 25. September 1777 in Berlin)

- Collected by sw_MATH on LambertW:
- LambertW: Analyze and Gaussianize skewed, heavy-tailed data , The Lambert W framework is a new generalized way to analyze skewed, heavy-tailed data. Lambert W random variables (RV) are based on an input/output framework where the input is a RV X with distribution F(x), and the output Y = func(X) has similar properties as X (but slightly skewed or heavy-tailed). Then this transformed RV Y has a Lambert W x F distribution - for details see References. This package contains functions to perform a Lambert W analysis of skewed and heavy-tailed data: data can be simulated, parameters can be estimated from real world data, quantiles can be computed, and results plotted/printed in a 'nice' way. Probably the most important function is 'Gaussianize', which works the same way as the R function 'scale' but actually makes your data Gaussian. An optional modular toolkit implementation allows users to define their own Lambert W x 'my favorite distribution' and use it for their analysis. (Source: http://cran.r-project.org/web/packages)

Search via the swMATH portal

- http://www.swmath.org/

Identification of software

- Check title and references of a publication

- The method is heuristic

- If the software name is on a prominent place in the title, it is called standard article

- There is no proper citation standard for software (yet)

Web Pages are generated

- Software name

- Description

- Keyword cloud

- Various metadata (manual)

- Related software

- Articles

- Some statistical data

- e.g.   http://www.swmath.org/

Where do we find the references?

- Zentralblatt (founded in 1931 by Otto Neugebauer) Springer publisher

  and Oberwolfach Research Institute
- An enormous treasure of information on Math, but how can we extract it? → Identification Problem
- Fachgruppe Computeralgebra Newsletter
- Wikipedia
- We can be convinced that at least some Math is contained there
- MSC , keywords
- MathNet

- Alternative Sources

  Mathematical Reviews

  special Conferences like ICMS 2016 , Berlin

  etc..

Advantages

- Publication based, i.e peer reviewed
- Because we have a lot of publications at hand,

 we are independent of the software manufacturers

- Not many manual analysis steps are needed

- Somehow independent of the „human stain".

Disadvantages

- Takes some time to get the publication printed plus time for a referee report in ZB_Math   -   Fast track needed

- Not all software items may be visible, e.g.

  „It is well known that ...“ „A new type of Science“

  with implicit refs.

- Some items may be misinterpreted,

  by using standard words, e.g. FORM

- Mostly no version information available

But...

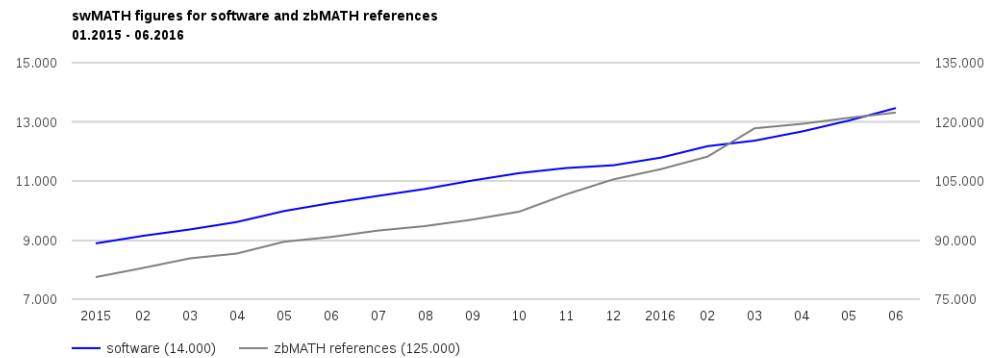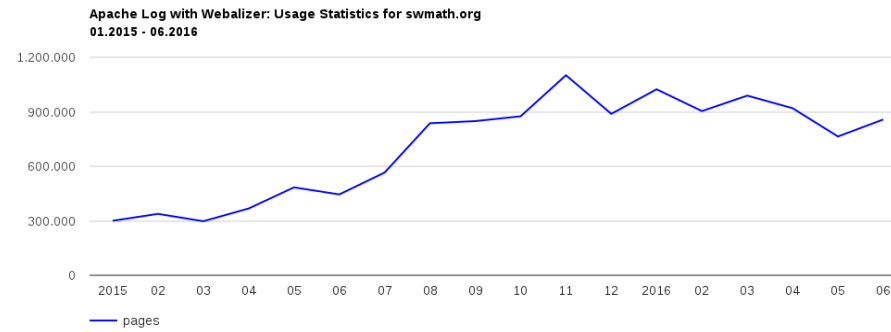- We can retrieve some info on the usage of the software.

  Maybe hard when comparisons are made. Also if the software is new and is called „Algorithm 1"

- There is a Fast Track mechanism

swMath Success Story

- Since its beginning sw_MATH has collected 123000 references (mostly) from Zentralblatt

- 13800 pieces of Software

- Constantly growing

Figures

Apache Log with Webalizer: Usage Statistics for swmath.org
01.2015 - 06.2016

swMATH figures for software and zbMATH references
01.2015 - 06.2016

Thank you

for your attention