Mapping the research collaboration networks in computer science: The case of central, eastern and southern African Countries.

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Motivation, problem area

Scientometrics

Main aim of the study

To determine the research collaboration networks in the field of computer Science across UbuntuNet alliance countries

Specific Research Objectives

1. Analyzed **publication growth trends and citation impact**;
2. Determined **global share and rank** of the computer science research;
3. Identified **research collaboration networks** within and outside of UbuntuNet countries;
4. Determined the **top-ranking countries, institutions and individuals** in the UbuntuNet region;
5. Identified **most preferred journals** by the computer science researchers;
6. Determined a **research trend** of the computer science research

Research approach, Methodology

- UbuntuNet counties publications between 1980-2016 were retrieved from Scopus
- Total UbuntuNet countries (n=16)

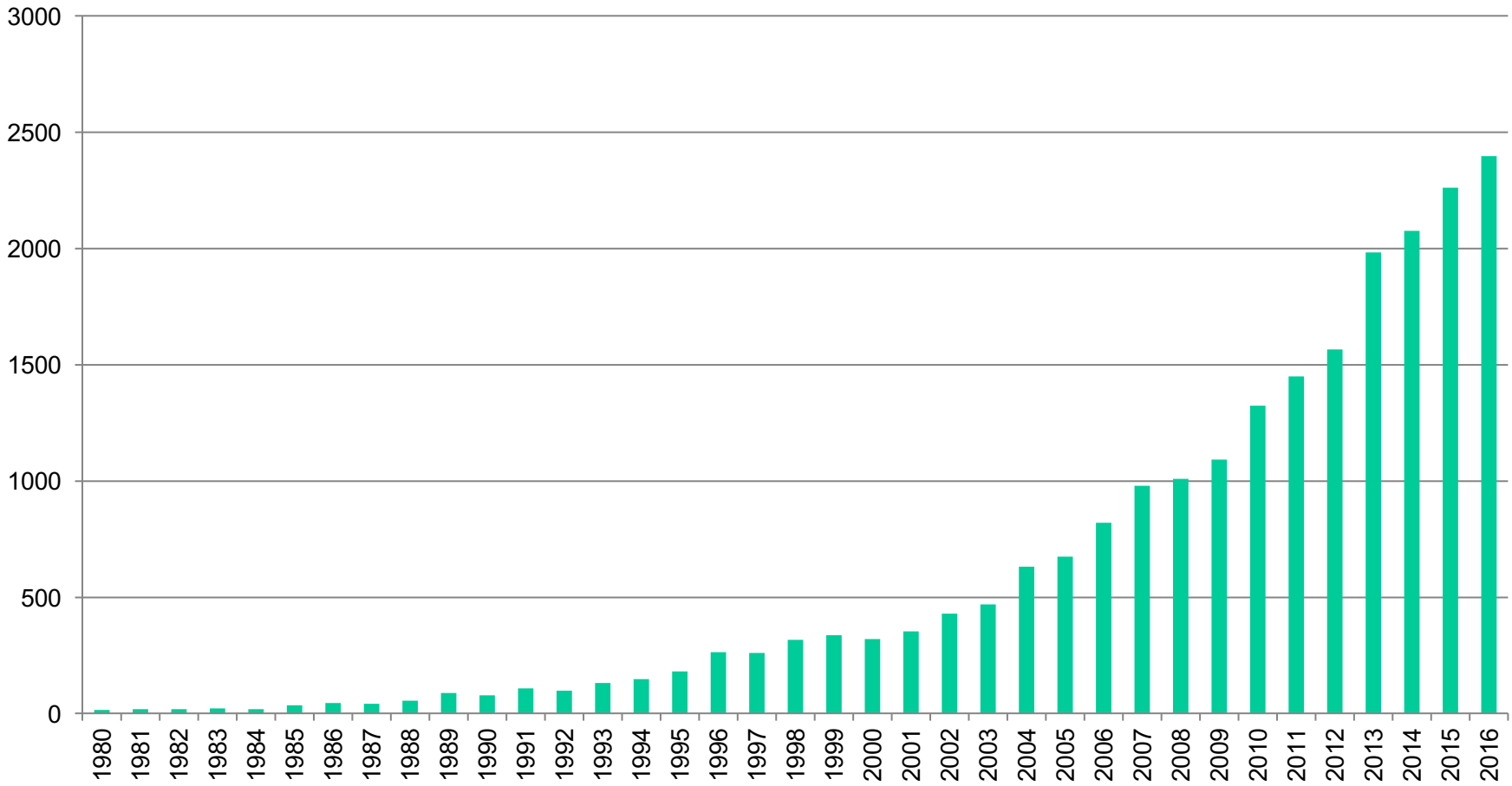
Scientometric analysis

- Data from Scopus uploaded in MySQL database and cleaned
- Python scripts - unpack the combined authors, institutions and keywords, subject index
- Data cleaning and analysis using Ms Excel
- Gephi software for network analysis of co-occurrences

Tools used

Study results

Total number of publications



Study results

Total publications and citations

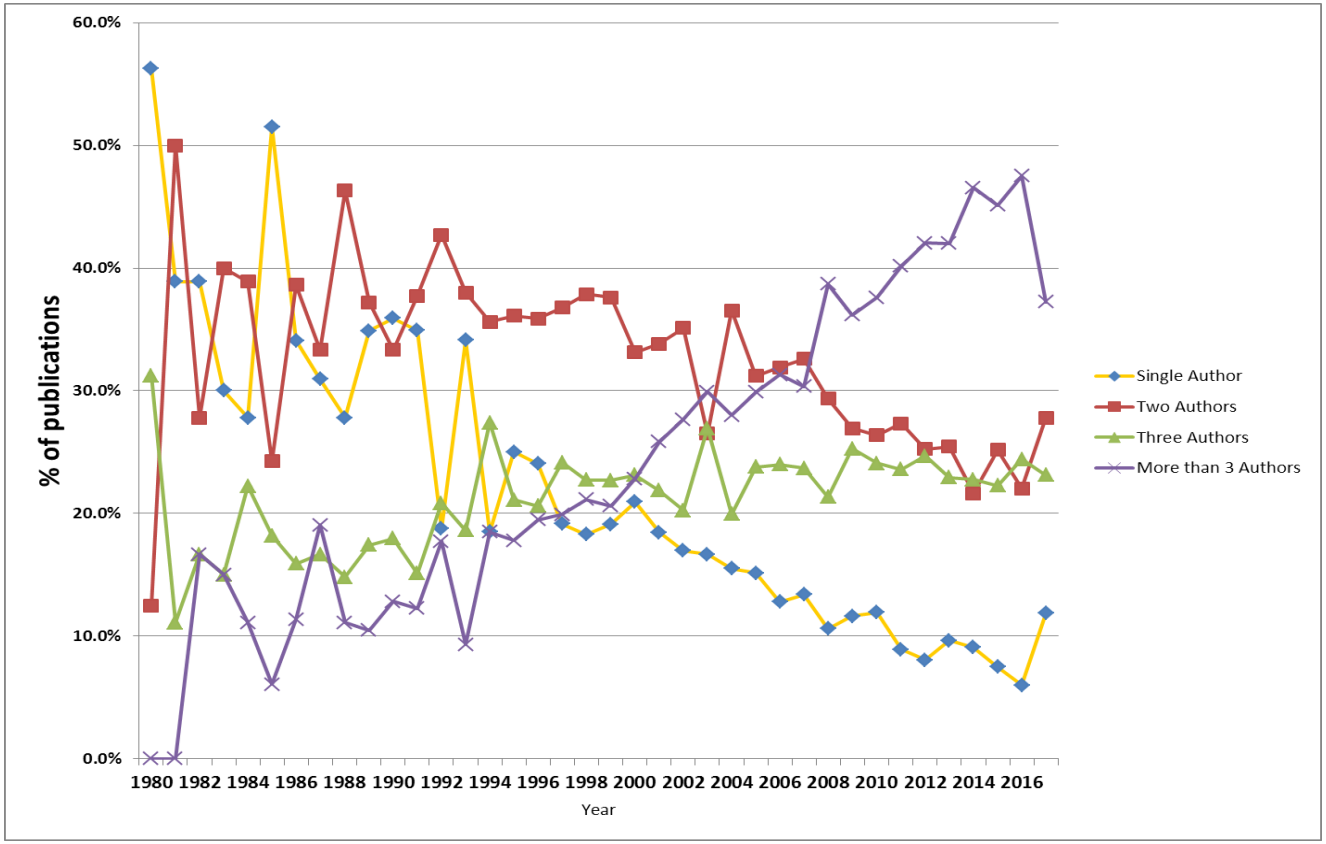
Total number All articles N= 22083
Sum of citations= 298144

Number of authors per paper

Authors	Publications
Single	2616
Two	6138
Three	5108
4 or more	8221
Total	22083

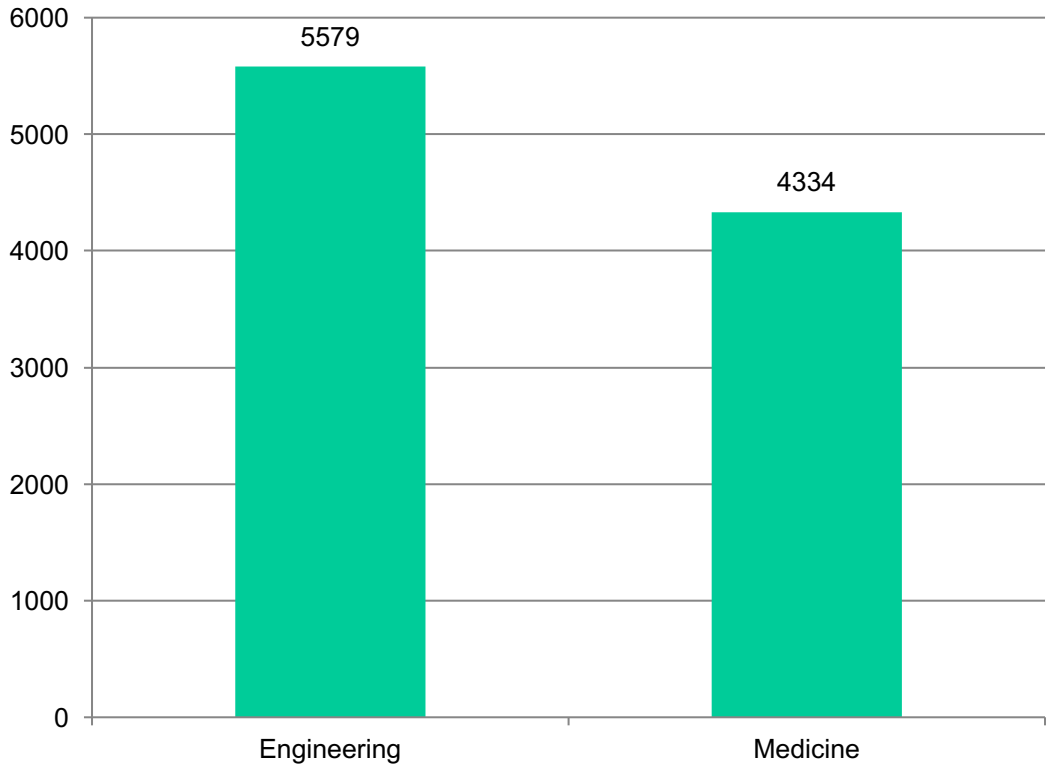
Single and multi-authored research

Evolution of single and multi-authored number of articles over the years

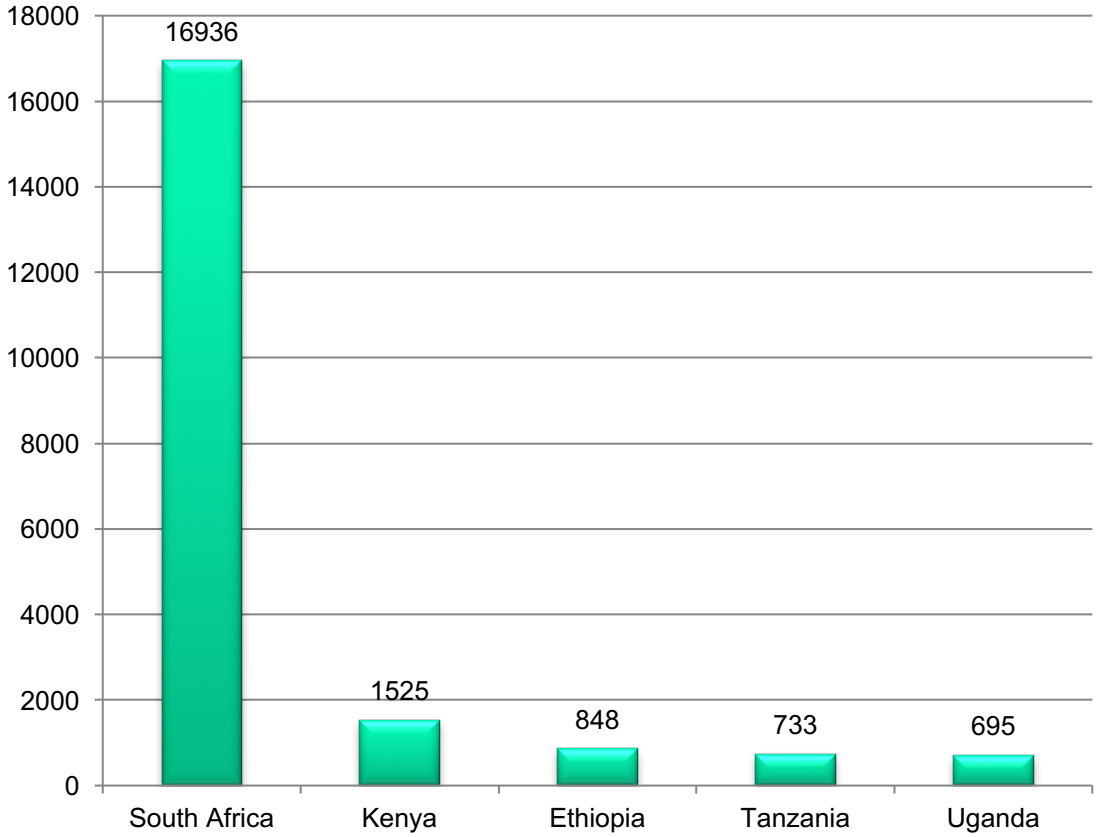


Trend of the research subjects

Some subjects field where computer sciences included

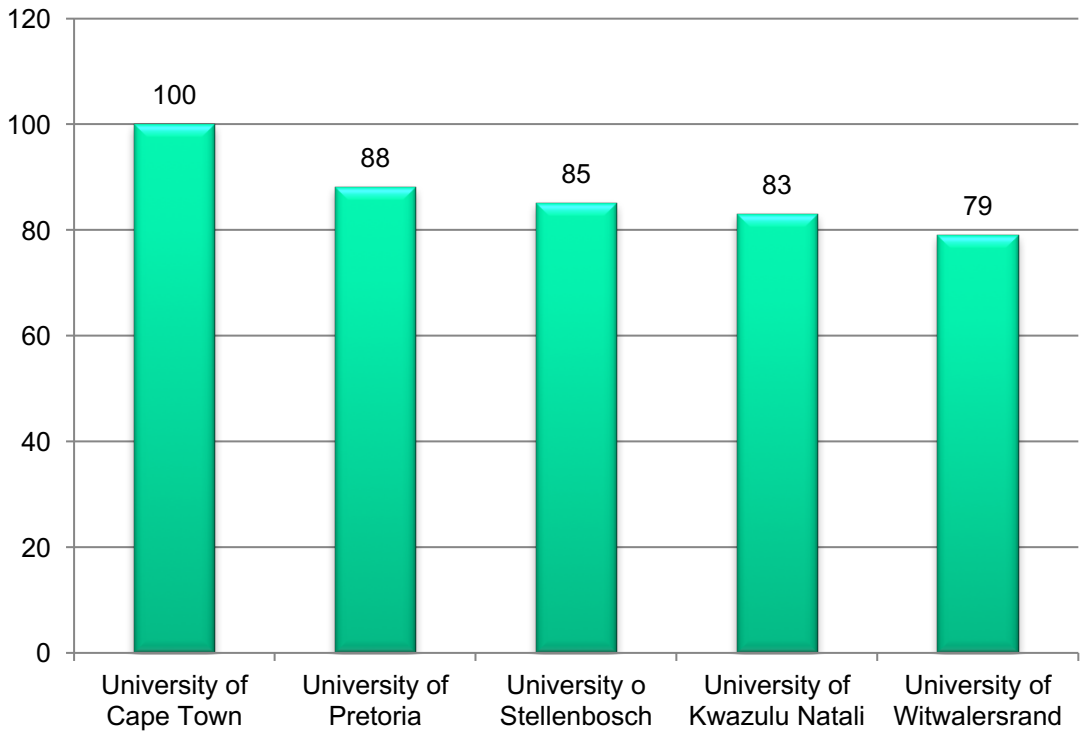


The top five UbuntuNet countries with high number of publications



SA (77.64%) Kenya (6.9%) Ethiopia 848 (3.8%), Tanzania (3.32%) and Uganda (3.14%)

The top five institutions



Network analysis reveled strong tie with between ubuntuNetresearchers with hubs of computer sciences in the USA,China and European instituion such as CERN

Top most cited paper in computer science

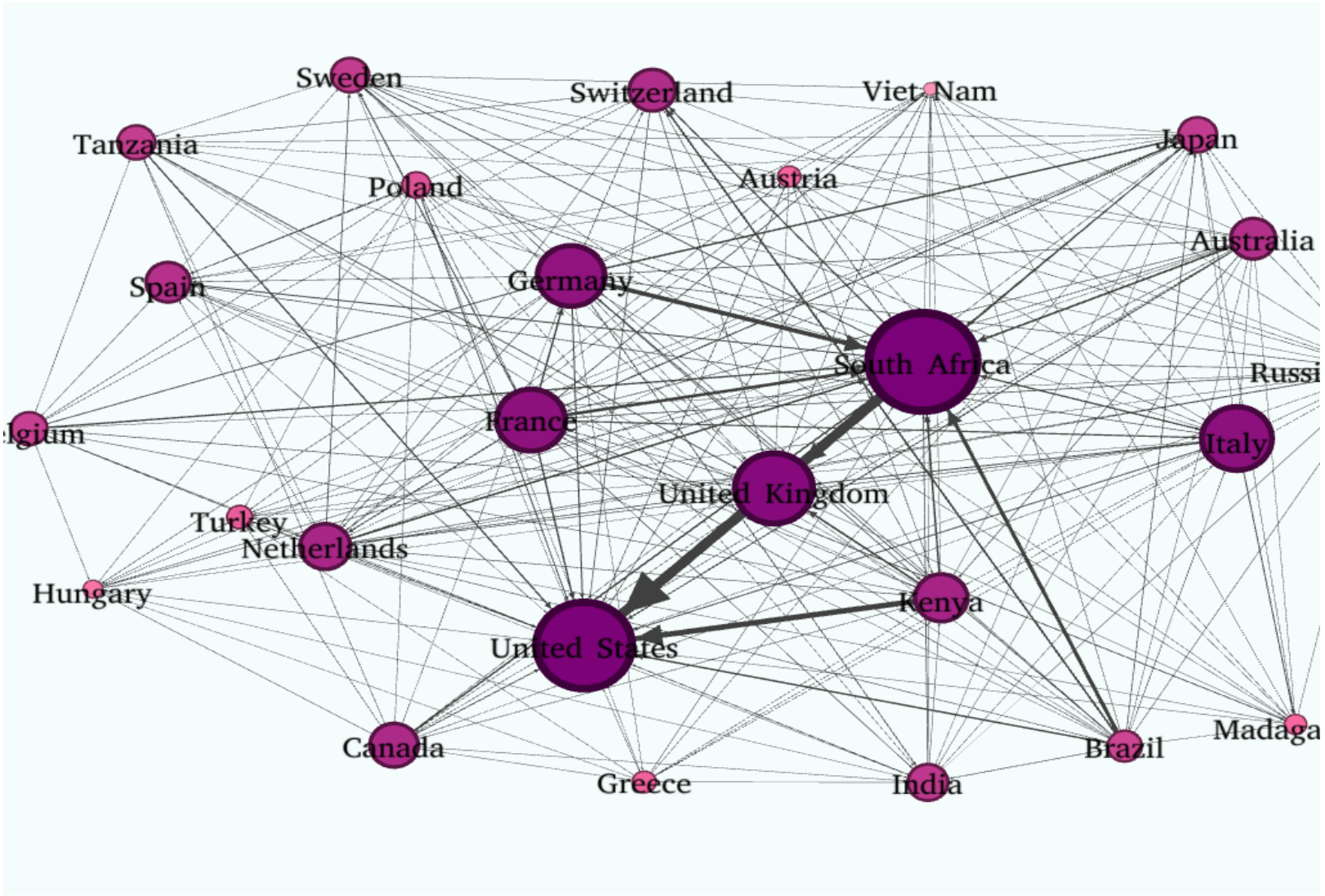
	Title of the paper	Citation count
1	Lozano R., et al., (2012). Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the Global Burden of Disease Study 2010. The Lancet.	4627
2	Vos T., et al., (2012). Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: A systematic analysis for the Global Burden of Disease Study 2010. The Lancet.	2365
3	Bhatt S., et al., (2013). The global distribution and burden of dengue. Nature.	1972
4	Hucka M., et al., (2003). The systems biology markup language (SBML): A medium for representation and exchange of biochemical network models. Bioinformatics.	1657
5	Naghavi M., et al., (2015). Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013. The Lancet.	1516
6	Frenk J., et al., (2010). Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. The Lancet.	1303
7	Compo G.P., et al., (2011). The Twentieth Century Reanalysis Project. Quarterly Journal of the Royal Meteorological Society.	1204
8	Martin D.P., et al., (2010). RDP3: A flexible and fast computer program for analyzing recombination. Bioinformatics.	1163
9	Vos T., et al., (2015). Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013. The Lancet.	1107
10	Keating B.A., et al., (2003). An overview of APSIM, a model designed for farming systems simulation. European Journal of Agronomy.	1096

Top most cited paper in computer science

Top most cited papers had the following characteristics

1. Published in high impact factor journals
2. Had an international focus
3. Some had deployed systematic review approach

- Network analysis of UbuntuNet researchers collaborate.
-Hubs in Computer Science in USA,China, Europen



Top Ten Citation performance per author (1980 – 2016)

No	Author	Country	Article Count	Sum of Citation	hindex	gindex	overall_rank
1	Snow	Kenya	36	2009	28	36	3
2	Brown	South Africa	29	3530	26	29	2
3	Noor	Kenya	28	1627	24	28	8
4	Stein	South Africa	50	2913	24	50	1
5	Thornton	Kenya	27	1354	20	27	14
6	Hay	Kenya	24	2055	20	24	8
7	von Solms	South Africa	51	1197	20	35	6
8	Wood	South Africa	53	971	19	30	10
9	Butterworth	South Africa	26	1059	18	26	18
10	Nurick	South Africa	38	963	18	31	15

Discussion of major findings

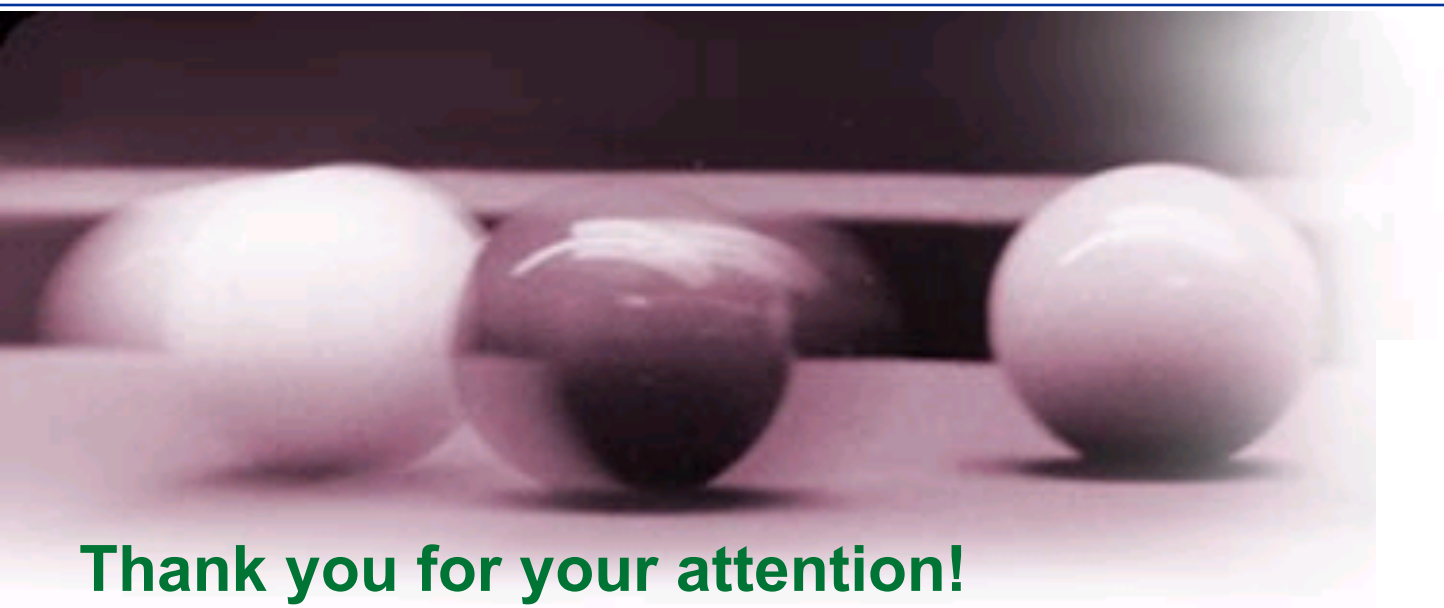
- Total of 22083 articles were published from 1980-2016
- journal articles (n= 13734, 62.2%), followed by conference papers (n= 7106, 32.2%) and review articles (n= 1243, 5.6%).
- *Most of the publications were multi-authored (88%)*
- High Degree of collaboration noted
- *The top subject area of research is computer Sciences followed by Engineering and Medicine*
- Top most Authors come from South Africa

Conclusions

- There is a strong evidence that the computer science research productivity and collaborative networks are growing
- However, there are variations on the level of research productivity among institutions and countries
- The intra-collaboration of research within UbuntuNet region is low as compared to the inter-collation between countries in UbuntuNet region and other countries outside Africa

Implications of the study findings

- Develop a scientometric tool for meta-analysis of research productivity and collaboration of African research
  - Currently we depend on foreign tools e.g. Scopus, Google Scholar
- Publish in journals that are widely visible (electronic & open access)
- Collaborate with external patners to increase impact
- Establish local online journals and improve visibility (number of citations)
- Automate scholars' profiles updates to show case research and grants performance on institution websites (repositories)
- Institutions to consider various metrics when evaluating the research productivity of individuals
- UbuntuNet Alliance to promote intra-collaborative research network by introducing
  - Introduce grants applications
  - Build capacity by conducting workshops and conferences n these issues
  - Pioneer to develop a scientometric tool for African



Thank you for your attention!

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