How Healthy are DocEng, JCDL and UMAP Series of Conferences?

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ACM SIGWEB sponsors and supports several conferences covering a wide range of topics. UMAP, JCDL and DocEng are three of the many sponsored conferences by ACM SIGWEB. UMAP, JCDL and DocEng are reputed conferences, being held for several years and has a large community of contributing authors and PC members. In this article, we present a study on the health of these three conferences based on several factors and metrics such as stability, openness, inbreeding, representativeness and sustainability. Studying the health of a conferences provides a reflection and historical overview in-terms of its performance which can be used by the conference community to bring improvements and ensure that the conference is meeting its desired objectives. We conduct statistical analysis and information visualization on the conference data downloaded from DBLP, ACM Digital Library web-pages and conference websites. Our analysis reveals that overall all the three conferences are showing good health indicators. We do observe variances in metrics values across conferences and within conferences across years.

1. RESEARCH MOTIVATION AND AIM

The ACM Special Interest Group on Hypertext and the Web (ACM SIGWEB)[1] sponsors seven annual conferences covering a wide range of topics such as hypertext & hypermedia, web science, digital libraries, document engineering, knowledge & information management, information retrieval, web search, data mining, knowledge discovery from databases, social media, user adaptation & personalization and user modeling. The seven ACM SIGWEB sponsored conferences are: HT (Hypertext and Social Media), JCDL (Joint Conference on Digital Library), DOCENG (Symposium on Document Engineering), WEBSCI (Web Science Conference), CIKM (Conference on Information and Knowledge Management), WSDM (Web Search and Data Mining) and UMAP (User Modelling, Adaptation and Personalization). All the seven ACM SIGWEB Conferences are prestigious and pre-

[1] http://www.sigweb.org/

mier conferences in the area of Web and provides an international forum for researchers and practitioners to exchange ideas, interact with each-other and present latest research results.

The ACM SIGWEB sponsored conferences have been successfully running over so many years and have become an important academic event for researchers and practitioners working in the area of Web. We believe that historical analysis and reflection of the recent past of the conference is important for the SIGWEB community to further improve the quality and impact of the conference. We believe that a bibliometric based analysis can be done to understand how the conferences have evolved over so many years and is it meeting its desired objectives. We select four out of seven conferences for analysis as they are relatively larger and broad than the remaining three conferences. In our previous paper, we studied CIKM, WEBSCI, HT and WSDM as their topical coverage is broad [Agarwal et al. 2017]. The topical coverage of JCDL, DocEng and UMAP is narrow and focused in comparison to CIKM, WEBSCI, HT and WSDM. For example, CIKM invites papers on the broad area of information and knowledge management whereas the focus of DocEng is primarily on document engineering which is a sub-area within information and knowledge management. Our objective is to divide our study into parts: present our analysis of the broad focused conferences in our previous paper (refer [Agarwal et al. 2017]) and present our study on the narrow topical coverage conferences in this paper. Our definition of narrow focused conference does not mean less in terms of participation or impact and rather narrow in terms of its topical coverage with respect to the broader topical coverage conferences.

We conduct an analysis of UMAP, JCDL and DocEng. DBLP[2] is popular on-line reference for open bibliographic information on computer science journals and proceedings. DBLP releases a snapshot of its bibliography database. We use the meta-data available from DBLP for our analysis. We extract the author(s) and paper titles for all the conferences in our dataset from DBLP dump and we extract information about the PC members and acceptance rate from the conference website and ACM Digital Library web pages.

Vasilescu et al. study the health of software engineering conferences with respect to community stability, openness to new authors, inbreeding, representativeness of the PC with respect to the authors community, availability of PC candidates, and scientific prestige [Vasilescu et al. 2014]. They propose several metrics which are indicators of the health of a conference and analyze nine conferences over a period of more than ten years [Vasilescu et al. 2014].

Our motivation is to study SIGWEB conferences from the perspective of the metrics defined by Vasilescu et al. The specific research aim of the work presented in this paper is to replicate the work by Vasilescu et al. [Vasilescu et al. 2014] on UMAP, JCDL and DocEng conferences and assess the health of these conferences with respect to factors such as author and PC turnover representing community stability, inbreeding and openness to new authors as well as representativeness of the PC with respect to the authors community. Our aim is determine if the conferences have a balanced PC turnover, have high openness to new authors and have high, moderate or low inbreeding.

[2] http://dblp.uni-trier.de/

2. RELATED WORK AND RESEARCH CONTRIBUTIONS

In this section, we present closely related work to the study presented in this paper and list the novel research contributions of our work in context to existing work. We first present two focused bibliometric analysis based studies conducted on ACM SIGWEB conferences and then discuss few research studies which are on bibliometric analysis of conferences in various computer science domains. Agarwal et al. present a bibliometric analysis of seven ACM SIGWEB sponsored conferences (HT, JCDL, DOCENG, WEBSCI, CIKM, WSDM, UMAP) [Agarwal et al. 2016a]. They analyze the DBLP data of the seven conferences since their beginning until September 17, 2015 [Agarwal et al. 2016a]. Agarwal et al. present a bibliometric analysis of scientific publications records of nine SIGWEB cooperating conferences (ASONAM, COMPUTE, IWCMC, RecSys. RuleML, W4A, WebIST, WebMedia and OpenSym) [Agarwal et al. 2016b]. They use the DBLP bibliographical database and perform an exploratory and scientometric analysis on publications, authors and conference database of 10 years (2006-2015) of SIGWEB cooperating conferences [Agarwal et al. 2016b].

The work by Vasilescu et al. is very closely related to our work [Vasilescu et al. 2014]. We replicate their study which was conducted on software engineering conferences to four ACM SIGWEB conferences [Vasilescu et al. 2014]. Agarwal et al. present a study on gender gap, imbalance and women participation in computer science research by conducting experiments on DBLP bibliographical database and analyzing several years of publication dataset across various domains of computer science research [Agarwal et al. 2016].

Sharma et al. conduct scientific paper publication mining and scientometric and bibliometric analysis of nine years of ISEC (India Software Engineering Conference) publications and programs [Sharma and Sureka 2016]. Sharma et al. present insights from a bibliometric analysis and scientific paper publication mining of 551 papers in Requirements Engineering (RE) series of conference (11 years from 2005 to 2015) [Sharma et al. 2016]. Kumar et al. conduct a bibliometric and scientific publication mining based study to how the Asia-Pacific Software Engineering Conference (APSEC) has evolved over a period of six years (year 2010 to 2015) [Kumar et al. 2016].

Sakr et al. study the program committees of four top-tier and prestigious database conferences (SIGMOD, VLDB, ICDE, EDBT) over a period of 10 years (20012010) [Sakr and Alomari 2012]. Elshawi et al. study the computer systems research community by analyzing the research publications and the program committee memberships of three top-tier and prestigious computer systems conferences (EuroSys, SOSP and OSDI) over the period between 2006 and 2014 [Elshawi and Sakr 2016]. Bergamaschi et al. analyze three conferences of interest to the SIGWEB community (WWW, Hypertext & Hypermedia and JCDL) for a period of one decade [Bergamaschi et al. 2012]. Bartneck et al. present a reflection on the first five years of the International Conference on Human Robot Interaction (HRI) [Bartneck 2010]. The work presented in this paper makes the following novel and unique contributions:

First study on assessing the health of three ACM SIGWEB sponsored conferences: UMAP, JCDL and DocEng with respect to several factors and metrics defined by Vasilescu et al. [Vasilescu et al. 2014] such as author and PC turnover representing community stability, inbreeding and openness to new authors as well as representativeness of the PC with

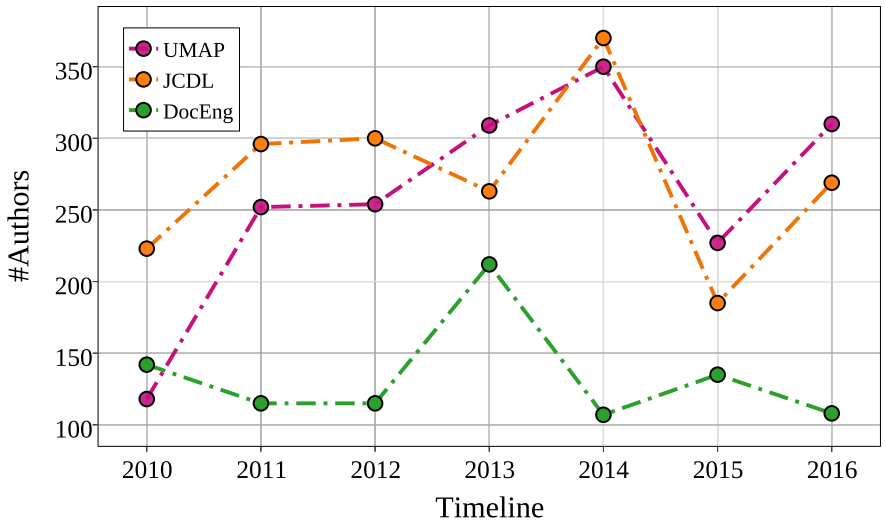

Fig. 1. **Basic Metrics Computations:** Demonstrates the Variation in Number of Distinct Authors for Conference C in Year Y.

respect to the authors community

3. BASIC METRICS

Vasilescu et al. define two basic metrics: #$A(c, y)$ and #$C(c, y)[\#PCmem]$ [Vasilescu et al. 2014]. #$A(c, y)$ denotes the number of distinct authors for conference c in year y. #$A(c, y)$ represents the participation level and number of authors who belong to the conference community. #$C(c, y)[\#PCmem]$ denotes the number of PC members for conference c in year y. #$A(c, y)$ represents the size of the PC community and not the author community. #$A(c, y)$ and #$C(c, y)[\#PCmem]$ combined indicates how large the conference community is in-terms of the distinct number of authors and PC members.

3.1 #A(c,y)

Figure 1 displays the trend for the number of distinct authors for the three conferences across a period of seven years from 2010 to 2016. The #A(UMAP,2010) is 118 and the #A(UMAP,2016) is 310. Hence the number of distinct authors for UMAP increased by 2.62 times. As shown in Figure 1, the number of distinct authors for UMAP increased from 2010 to 2014 and then decreased significantly in 2015. The maximum value for #A(UMAP,y) is for y=2014. The minimum value of #A(JCDL,y) is for y=2015 and the maximum value of #A(JCDL,y) is for y=2014. We observe both upward and downward trends in the line graph for #A(JCDL,y).

The largest decline in the #A(JCDL,y) value is from the year 2014 to 2015. The decline from 2014 to 2015 is 50%. We observe that overall there is an upward trend in number of distinct authors for JCDL. The number of distinct authors in 2016 is 1.2 times of the number of distinct authors in 2010. Figure 1 reveals that DocEng is a relatively smaller

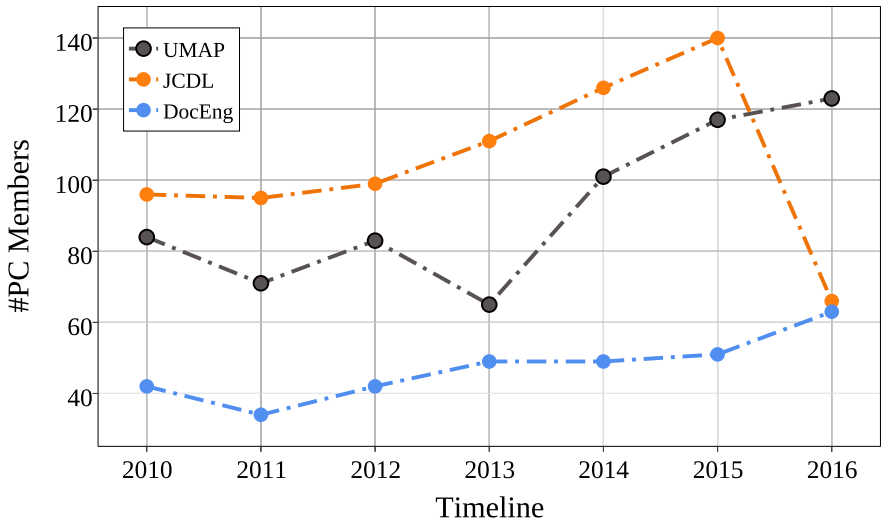

Fig. 2. **Basic Metrics Computations:** Number of PC members for conference c in year y. #C(c,y) [#PCmem]

conference in comparison to UMAP and JCDL. In comparison to UMAP and JCDL, the number of distinct authors reduced in DocEng. The number of distinct authors reduced by 24%. The maximum value for #A(DocEng,y) is for y=2013. The maximum value #A(DocEng,2013) is 212. The minimum value for #A(DocEng,y) is for y=2014. The maximum value #A(DocEng,2014) is 107.

3.2 #C(c,y) [#PCmem]

Figure 2 displays the number of PC members for conference c in year y which is denoted as: #C(c,y) [#PCmem]. The #PCmem value for UMAP increased from 84 in 2010 to 123 in 2016. The number of PC members for UMAP increased by 46.42% from 2010 to 2016. From Figure 2, we observe an increasing trend for UMAP in number of PC members from 2013 to 2016. The maximum value for #PCmem for UMAP is 123 which occurs in the year 2016. The #PCmem value for JCDL is minimum for the year 2016 during the seven year period under study. The #PCmem value declines from 140 in the year 2015 to 66 in the year 2016.

The #PCmem value for JCDL for 2010 is 96. Figure 2 reveals that DocEng is a relative smaller conference in comparison to UMAP and JCDL with respect to the number of PC members. The number of PC members for DocEng in the year 2010 is 42 and in the year 2016 is 63. Overall, the #PCmem value shows a 50% increase from 2010 to 2016. The number of PC members for DocEng varies in the range of 34 to 63 during the seven year period under study. We observe that #PCmem for DocEng is above 50 for only two out of seven years. We do not observe any constantly increasing or decreasing trend for the #PCmem values for all the three conferences.

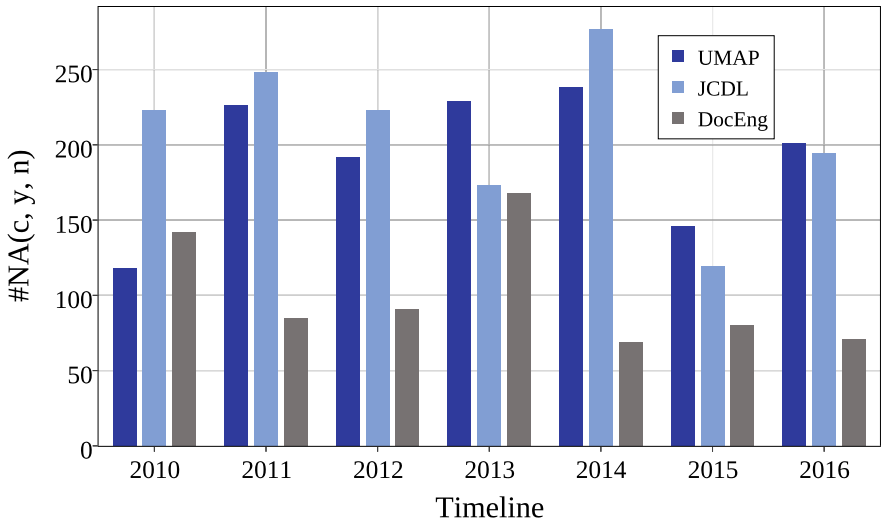

Fig. 3. **Stability Metrics Computation:** Number of New Authors for Conference C in Year Y that were not Author in Years $Y - N$ to $Y - 1$. N=4

4. STABILITY

4.1 #$NA(c, y, n)$

#NA(c, y, n) denotes the Number of New Authors for conference c in year y that were not author in years y - n to y - 1. As shown in Figure 3, we compute the #NA(c, y, n) values for all the three conferences (UMAP, JCDL and DocEng) in our dataset and keeping the window size n equal to 4. Ability to attract new authors and author turnover is an important indicator of conference stability [Vasilescu et al. 2014]. A high author turnover shows that the conference is dynamic and able to attract new authors with respect to the previous editions of the conference. Figure 3 shows that #NA(UMAP, y, 4) value for UMAP varies from a minimum of 118 in the year 2010 to a maximum of 229 in the year 2013.

We observe that with respect to the year 2010, the #NA(UMAP, y, 4) value increases by 70.33% (from 118 to 201). Unlike UMAP, the #NA(JCDL, y, 4) value declines in the year 2016 with respect to the year 223. The decline in year 2016 with respect to the year 2010 is 13%. The range for the #NA(JCDL, y, 4) is 277-119=158. Figure 3 reveals that the #NA(DocEng, y, 4) values for DocEng is relatively lower than the corresponding values for UMAP and JCDL. We observe that with respect to 2010, there is a significant decline in the #NA(DocEng, y, 4) value for 2016. The decline from 2010 to 2016 is 50%. Figure 3 shows that the highest value for #NA(DocEng, y, 4) occurs during the year 2013.

4.2 #NC(c, y, n) [#(real)newPCmem]

Figure 4 shows the trends on number of new PC members for conference c in year y that were not PC member in years y-n to y-1 (n=4). Figure 4 reveals that the #NC(UMAP, y, 4) value varies between the range of 7 to 64. We observe that with respect to the year

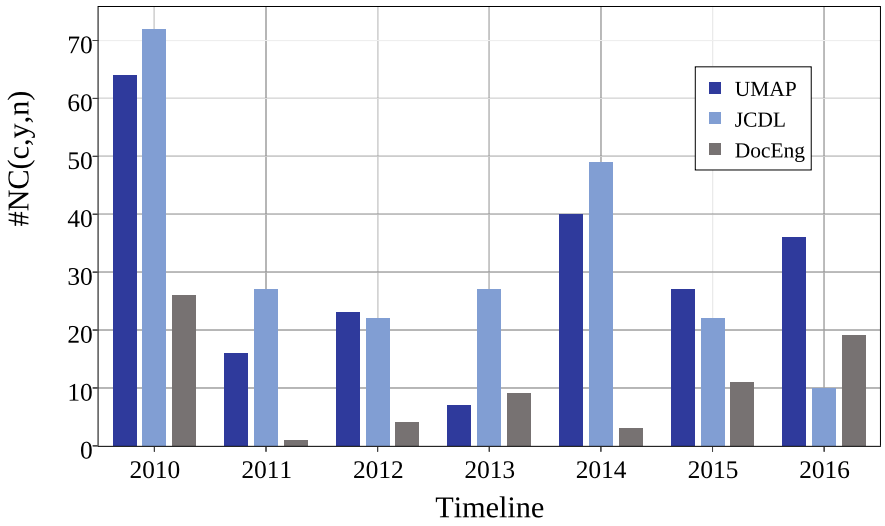

Fig. 4. **Stability Metrics Computation:** Number of New PC members for conference c in year y that were not PC member in years y-n to y-1. N=4

2010, there is a 43.75% decline in the #NC(UMAP, y, 4) value for the year 2016. The largest decline in the #NC(UMAP, y, 4 value is from the year 2010 to 2011 and the largest increment is from the year 2013 to 2014. Figure 4 shows that there is a steep decline in the #NC(JCDL, y, 4) value from the year 2010 to the year 2016.

The #NC(JCDL, 2010, 4) is 72 and the #NC(JCDL, 2016, 4) is 10 resulting in an overall decline of 86.11%. We observe a steeply declining trend in the #NC(JCDL, y, 4) value from the year 2014 to 2016. In comparison to UMAP and JCDL, the #NC(DocEng, y, 4) values for DocEng is relatively smaller for the corresponding years. The highest #NC(DocEng, y, 4) value is for the year 2010 which is 26. As shown in Figure 4, the #NC(DocEng, y, 4) value is below 10 for the 4 year period from 2011 to 2014. Similar to UMAP and JCDL, there is a decline in the #NC(DocEng, y, 4) value from the year 2010 to 2016.

4.3 $RNA(c, y, n)$

RNA(c, y, n) represents author turnover which is equal to the ratio of new authors for conference c in year y with respect to years y-n to y-1. Figure 5 displays the author turnover for all the three conferences in our dataset across the 7 year period. Figure 5 reveals that the RNA(UMAP, y, 4) value for UMAP varies from a minimum of 0.16 in the year 2015 to 1.91 in the year 2011. We observe a steady decline in the RNA(UMAP, y, 4) value from the year 2011 to 2015. The RNA(JCDL, 2016, 4) is 0.244 which is the recent most year in our dataset.

Figure 5 shows a steep decline in the RNA(JCDL, 2014, 4) value from 0.31 to 0.129 in the year 2015. From Figure 5, we observe that the RNA(c, y, n) value for both UMAP and JCDL is same for the year 2016 which is 0.24. Figure 5 shows that the RNA(DocEng, 2016, 4) is 0.17 which is lower than the previous year value of 0.19. The RNA(DocEng,

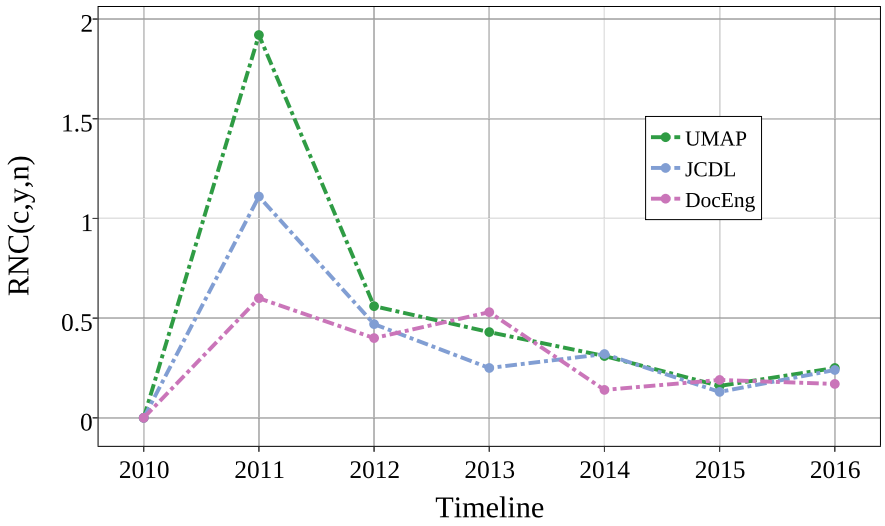

Fig. 5. **Stability Metrics:** Author turnover = Ratio of New Authors for conference c in year y w.r.t. years y-n to y-1

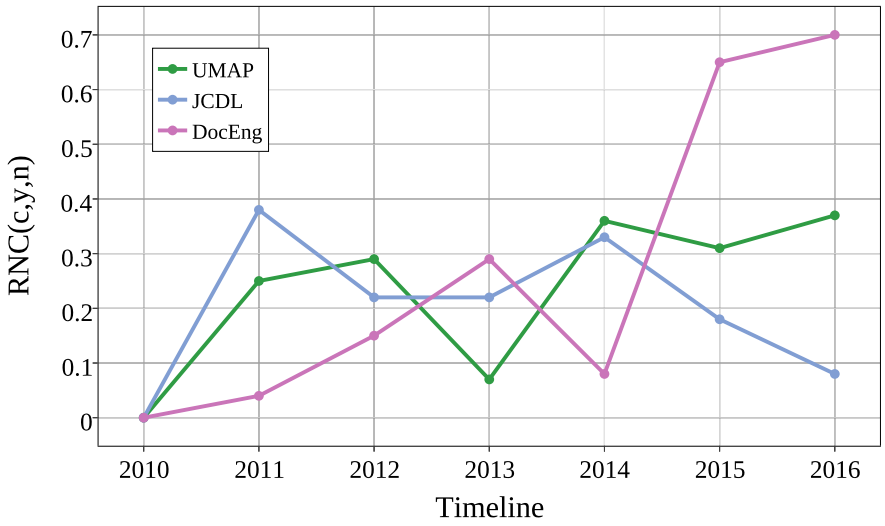

Fig. 6. **Stability Metrics:** PC turnover = Ratio of New programme Committee members for conference c in year y w.r.t. years y-n to y-1

y, 4) value is the lowest for the year 2014 which is 0.14. The steepest decline in the RNA(DocEng, y, 4) value is from the year 2013 to 2014. The decline from 2013 to 2014 is 73%.

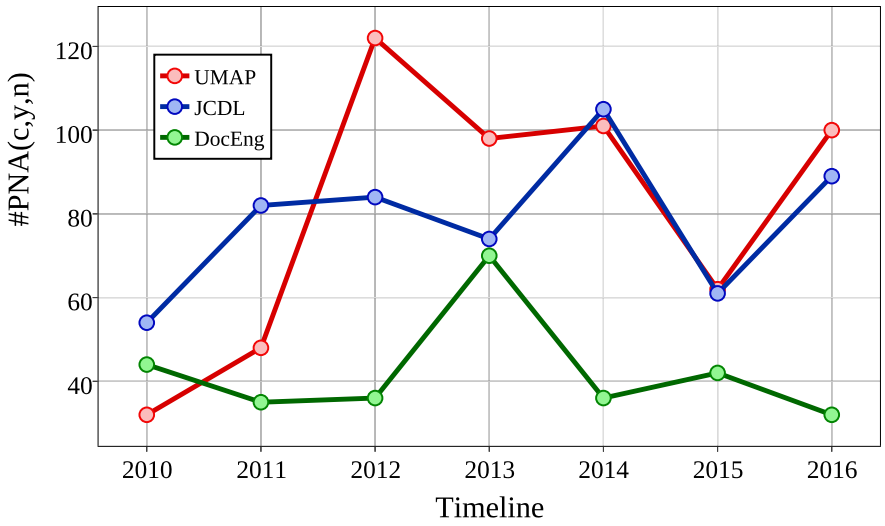

Fig. 7. **Openness Metrics Computation:** Number of Papers of conference c in year y by New Authors for which none of the co-authors has published at this conference in years y-n to y-1

4.4 RNC(c, y, n) [(real)newPCprop]

RNC(c, y, n) [(real)newPCprop] denotes PC turnover which is equal to the ratio of new Program Committee members for conference c in year y with respect to years y-n to y-1. Figure 6 displays the PC turnover for all the three conferences from 2010 to 2016. The RNC(UMAP, 2016, 4) value is 0.37 which is an increase of 19% from 2015. As shown in Figure 6, the RNC(UMAP, y, 4) is very low for the year 2013. The steepest decline in the RNC(UMAP, y, 4) value is from 2012 to 2013 and a significant increase is from 2013 to 2014.

The highest value for RNC(UMAP, y, 4) is for the year 2014 which is 0.36. Figure 6 reveals that the RNC(JCDL, y, 4) value for the year 2016 is 0.083 which is a steep decline from the previous year value of 0.176. We observe a steady decline in the RNC(JCDL, y, 4) value from the year 2014 to 2016. The RNC(DocEng, 2016, 4) is 0.703 which is higher than the corresponding values for UMAP and JCDL. Figure 6 reveals that the there is steep decline in the RNC(JCDL, y, 4) value from the year 2013 to 2014 and then a steep increase from 2014 to 2015.

5. OPENNESS

5.1 #PNA(c, y, n)

#PNA(c, y, n) denotes number of papers of conference c in year y by new authors for which none of the co-authors has published at this conference in years y-n to y-1. Figure 7 shows trends on the #PNA(c, y, n) metrics for the three conferences for the seven year period from 2010 to 2016. Figure 7 reveals that the #PNA(UMAP, y, 4) value is maximum for the year 2012 and minimum for the year 2010. The #PNA(UMAP, y, 4) value varies

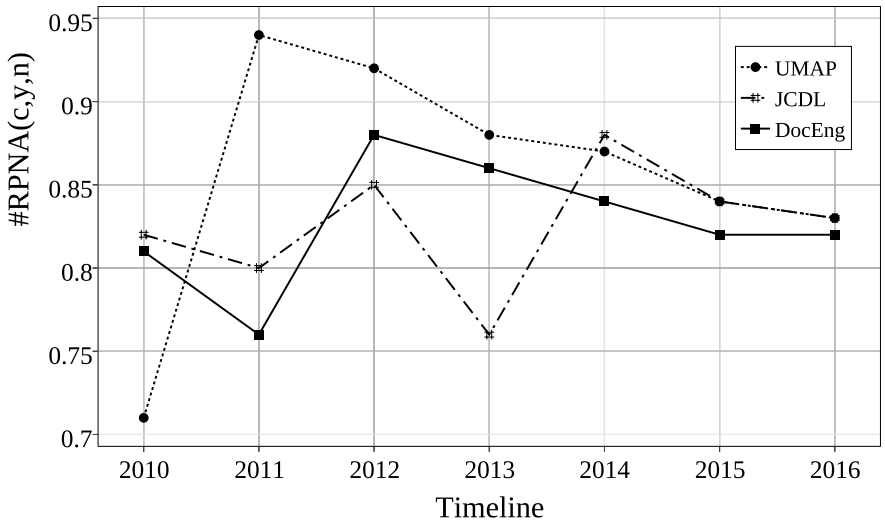

Fig. 8. **Openness Metrics Computation:** Ratio of Papers (by New Authors) for conference c in year y for which none of the co-authors has published at this conference in years y-n to y-1

within a range of 32 to 122 during the 7 year period. We observe a 61.3% increase in the #PNA(UMAP, y, 4) value from the year 2015 to 2016. We observe that the #PNA(JCDL, y, 4) varies from a minimum of 54 in the year 2010 to a maximum of 105 in the year 2014. Overall, the #PNA(JCDL, y, 4) value shows an increasing trend from year 2010 to 2016 as the #PNA(JCDL, 2016, 4) is 1.65 times #PNA(JCDL, 2010, 4).

The #PNA(JCDL, y, 4) is more than 100 only once during the year 2014 otherwise it is always below 100 unlike UMAP in which the #PNA(UMAP, y, 4) value is above 100 for 3 out of the 7 years. As shown in Figure 7, unlike UMAP and JCDL, there is an overall decline in the#PNA(DocEng, y, 4) for DocEng from the period 2010 to 2016. The #PNA(DocEng, 2010, 4) is 44 and #PNA(DocEng, 2016, 4) is 32. The maximum #PNA(DocEng, y, 4) value is 70 for the year 2013. The #PNA(DocEng, y, 4) value varies from 32 to 44 except the year 2013. Figure 7 reveals that the maximum increase in the #PNA(DocEng, y, 4) value is from the year 2012 to 2013. The #PNA(DocEng, y, 4) value from the year 2012 to 2013 shows an increase of 94.44%.

5.2 RPNA(c, y, n)

RPNA(c, y, n) denotes ratio of papers (by new authors) for conference c in year y for which none of the co-authors has published at this conference in years y-n to y-1. Figure 8 shows trends on the RPNA(c, y, n) metrics for the three conferences across the seven year period under study. The RPNA(UMAP, 2010, 4) is 0.71 which increases to 0.94 in the year 2011. From Figure 8, we observe that the RPNA(UMAP, y, 4) varies from a minimum of 0.71 in the year 2010 to a maximum of 0.94 in the year 2011. The RPNA(UMAP, y, 4) shows a constant and consistent decline from 0.94 in 2011 to 0.83 in 2016.

The RPNA(JCDL, y, 4) varies from a minimum of 0.76 in 2013 to a maximum of 0.88 in

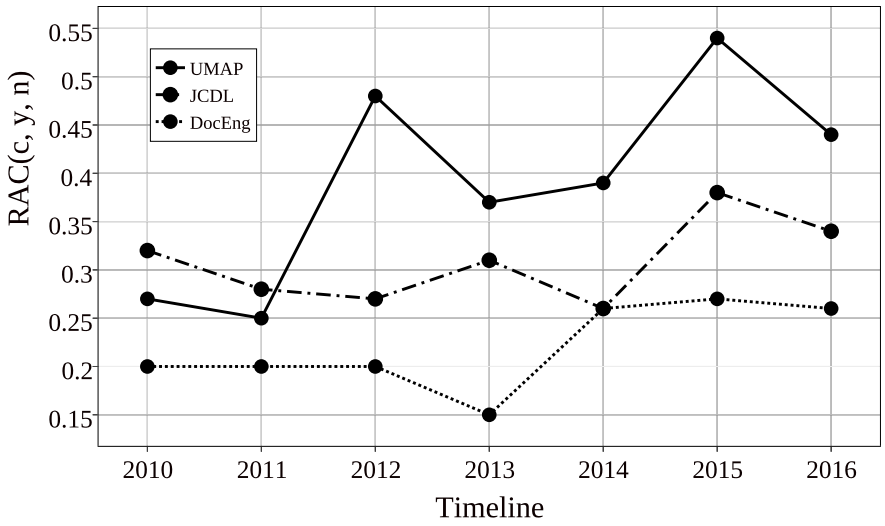

Fig. 9. **Inbreeding Metrics Computation:** Ratio of accepted papers for conference c in year y co-authored by program committee members who served at least once during years y-n to y

2014. Unlike UMAP, the RPNA value for JCDL does not show a significant increasing or decreasing trend from 2010 to 2016. We observe that other than the year 2013, the RPNA value for JCDL is always above 0.80. Similarly to JCDL, the RPNA value for DocEng does not show a significantly increasing or decreasing trend from 2010 to 2016 as the RPNA(DocEng, 2010, 4) is 0.81 and RPNA(DocEng, 2016, 4) is 0.82. The maximum RPNA(DocEng, y, 4) value is 0.88 which occurs during the year 2012. Figure 8 reveals that except for the year 2011, the RPNA(DocEng, y, 4) for DocEng is always above 0.8 but below 0.9.

6. INBREEDING

6.1 RAC(c, y, n) [PCaccProp]

RAC(c, y, n) [PCaccProp] denotes ratio of accepted papers for conference c in year y coauthored by PC members who served at least once during years y-n to y. Inbreeding is an indicator of the fraction of papers co-authored by PC members. Figure 9 shows the trends on inbreeding metrics for the three conferences across a seven year period. The RAC(UMAP, 2010, 4) value is 0.27 which increases to 0.54 in 2015 and then declines to 0.44 in 2016. Figure 9 reveals that the minimum RAC(UMAP, y, 4) value is for the year 2011 and the maximum RAC(UMAP, y, 4) value is for the year 2015. Figure 9 shows both upward and downward trend in the RAC(UMAP, y, 4) metric.

The RAC(JCDL, y, 4) value declines for 3 years from 2010 to 2012 and then increases to 0.31 in the year 2013. The RAC(JCDL, y, 4) value varies within a range of 0.26 to 0.38. The maximum RAC(JCDL, y, 4) value is 0.38 which occurs during 2015. The RAC(DocEng, y, 4) value varies from a minimum of 0.15 in the year 2013 to a maximum of 0.27 in the year 2015. As shown in Figure 9, the RAC(DocEng, y, 4) value is approximately

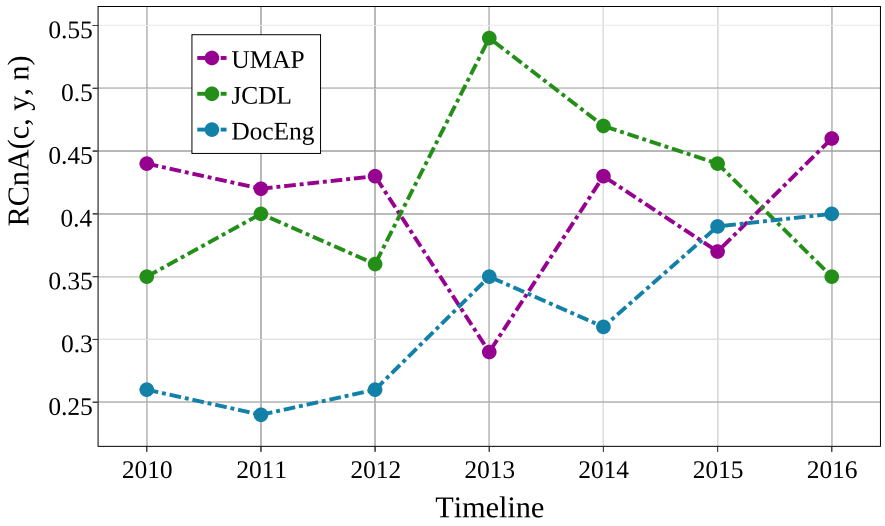

Fig. 10. **Representativeness Metrics Computation:** Ratio of PC members for conference c in year y that never have co-authored a paper at preceding instances of c between y-n and y-1

0.26 and 0.27 for the past three years based on our study (from year 2014 to 2016). We observe that the RAC(DocEng, y, 4) value is constant for the three year period of 2010 to 2012.

7. REPRESENTATIVENESS

7.1 RCnA(c, y, n)

RCnA(c, y, n) denotes the ratio of PC members for conference c in year y that have never co-authored a paper at preceding instances of c between y-n and y-1. Figure 10 displays the trends for the representativeness metrics for the three conferences across a period of seven years. Vasilescu et al. define the representative metrics based on the belief that PC members should be representative of their respective communities, i.e., they should largely be established authors within those communities. However, not all PC members should be expected to have published at a conference before [Vasilescu et al. 2014]. The RCnA(UMAP, y, 4) for UMAP varies from a minimum of 0.29 in the year 2013 to a maximum of 0.46 in the year 2016. We observe that the RCnA(UMAP, y, 4) for UMAP is the highest for the year 2016 which is the most recent year in our study.

According to the Figure 10, the ratio of PC members for conference UMAP in year 2015 that have never co-authored a paper at preceding instances of UMAP between 2011 and 2014 is 0.37. The RCnA(JCDL, y, 4) for JCDL varies within the range of 0.35 to 0.54. The minimum value for RCnA(JCDL, y, 4) is for the year 2010 and 2016 and the maximum value is for the year 2013. Figure 10 reveals that there is a declining trend in the RCnA(JCDL, y, 4) value from the year 2013 to 2016. The RCnA(JCDL, y, 4) value declines by 35.18% from 2013 to 2016. The RCnA(DocEng, y, 4) value for DocEng varies from a minimum of 0.24 in the year 2011 to a maximum of 0.40 in the year 2016. Similar

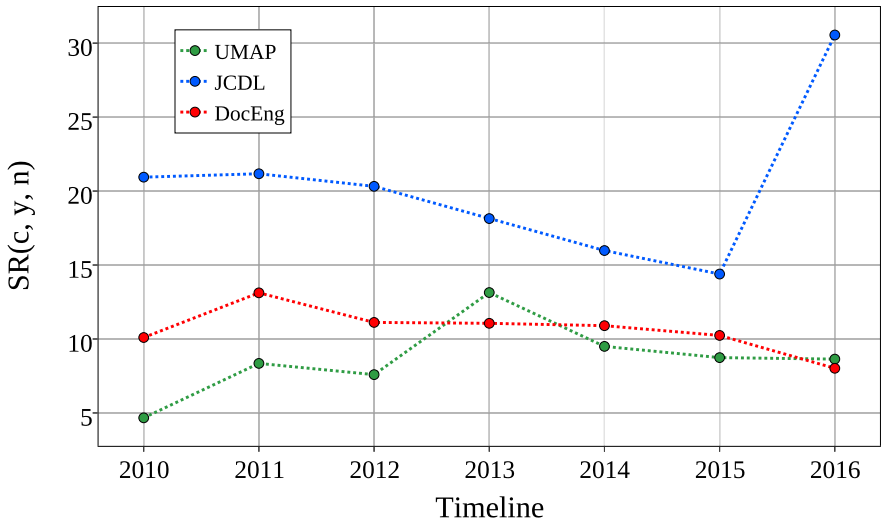

Fig. 11. **Sustainability Metrics:** Ratio between the number of core authors that have not served on the PC in years y-n to y and #C(c,y).

to UMAP, the maximum value of DocEng occurs in the year 2016. From Figure 10, we observe that the highest increase in the RCnA(DocEng, y, 4) value is from the year 2012 to 2013. The RCnA(DocEng, 2012, 4) value is 0.26 and the RCnA(DocEng, 2013, 4) is 0.35 showing a 34.61% increase.

8. SUSTAINABILITY

8.1 SR(c, y, n)

SR(c, y, n) denotes the ratio between the number of core authors that have not served on the PC in years $y - n$ to y and #C(c, y). #C(c, y) denotes the number of PC members for conference c in year y. Vasilescu et al. define core author for a given conference as an author who frequently (co)authored papers published at that conference during the current or previous four editions [Vasilescu et al. 2014]. Figure 11 shows trends on the sustainability metrics for the three conferences over a period of seven years. The SR(UMAP, y, 4) varies between the range of 4.67 in the year 2010 to 13.13 in the year 2013. Figure 11 reveals that there is a continuous declining trend in the SR(UMAP, y, 4) value from 2013 to 2016. The SR(UMAP, y, 4) value declined from 13.13 in 2013 to 8.64 in 2016.

There is a significant increase in the SR(UMAP, y, 4) value from 2012 to 2013. The SR(UMAP, y, 4) value increases by 72.9% from 2012 to 2013. The SR(JCDL, y, 4) maximum value is 30.54 which occurs for the year 2016. In comparison to the UMAP conference, the SR(c, y, n) values for the JCDL are higher. The SR(c, y, n) values for the JCDL conference is always higher than the corresponding values for the UMAP conference. Figure 11 reveals that the SR(JCDL, y, 4) value declines consistently from the year 2011 to 2015. However, the SR(JCDL, y, 4) value rises steeply during the year 2016. The range for the SR(JCDL, y, 4) is 30.54-15.98=14.56. In comparison to JCDL, the SR(DocEng, y, 4)

value for DocEng is lower and also has a smaller range. The range for SR(DocEng, y, 4) is 5.1. The minimum SR(DocEng, y, 4) value occurs during the year 2016 and the maximum SR(DocEng, y, 4) value occurs during the year 2011. The SR(c, y, n) value increases from 2010 to 2016 for UMAP and JCDL but declines for DocEng.

9. CONCLUSION

DocEng is a relatively smaller conference with respect to UMAP and JCDL in-terms of the number of distinct authors and PC members. JCDL has recently lower stability in-terms of the PC turn-over. DocEng has recently shown a lower author turnover. The recent sustainability value for JCDL is relatively much better than the corresponding value for UMAP and DocEng. The representativeness metric for all the three conferences are encouraging. UMAP has a high inbreeding and openness whereas the inbreeding for DocEng is relatively lower.

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