PROJECT PERIODIC REPORT

Grant Agreement number: 288956

Project acronym: NADINE

Project title: New tools and Algorithms for Directed Network analysis

Funding Scheme: Small or medium-scale focused research project (STREP)

Periodic report: **1st X 2nd**

Period covered: **from 1.5.2012**   **to 31.10.2013**

Name, title and organisation of the scientific representative of the project's coordinator[1]:

Dr. Dima Shepelyansky

Directeur de recherche au CNRS

Lab de Phys. Theorique, Universite Paul Sabatier, 31062 Toulouse, France

Tel: +331 5 61556068, Fax: +33 5 61556065, Secr.: +33 5 61557572

E-mail: dima@irsamc.ups-tlse.fr; URL: www.quantware.ups-tlse.fr/dima

Project website address: **www.quantware.ups-tlse.fr/FETNADINE/**

---

[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the grant agreement

NADINE DELIVERABLE D1.1.

It is based on milestones M1, M2, M5 with deliverable publications

[1] P1.1 L.Ermann, A.D.Chepelianskii and D.L.Shepelyansky, **"Towards two-dimensional search engines"**, J. Phys. A: Math. Theor. v.45, p.275101 (2012) (arXiv:1106.6215[cs.IR])

[5] P1.5 K.M.Frahm and D.L. Shepelyansky **"Google matrix of Twitter"**, Eur. Phys. J. B v.85, p.355 (2012) (arXiv:1207.3414[cs.SI], 2012

[8] P1.8 Y.-H.Eom, K.M.Frahm, A.Benczur and D.L. Shepelyansky, **"Time evolution of Wikipedia network ranking"**, submitted Eur. Phys. J. B (2013) (arXiv:1304.6601 [physics.soc-ph], 2013)

[10] P1.10 Y.-H.Eom and D.L. Shepelyansky, **"Highlighting entanglement of cultures via ranking of multilingual Wikipedia articles"**, PLoS ONE v.8(10), p.e74554 (2013) (arXiv:1306.6259 [cs.SI], 2013)

[13] P2.1 N. Litvak, and R. van der Hofstad, **"Uncovering disassortativity in large scale-free networks"**, Phys. Rev. E, 87(2), p. 022801 (2013) (arXiv:1204.0266v3[physics.soc-ph], 2012

[14] P2.2 N. Litvak, and R. van der Hofstad, **"Degree-degree correlations in random graphs with heavy-tailed degrees"**, to appear in Internet mathematics (2013) (arXiv:1202.3071[math.PR])

[15] P2.3 K.Avrachenkov, N. Litvak, M. Sokol, and D. Towsley, **"Quick detection of nodes with large degrees"**, In: 9th International Workshop on Algorithms and Models for the Web Graph, WAW 2012, 22-23 June 2012, Halifax, NS, Canada. pp.54-65. Lecture Notes in Computer Science 7323, Springer Verlag (2012). Extended version accepted in Internet Mathematics

[16] P2.4 K.Avrachenkov, N. Litvak, V.Medyanikov, M. Sokol, **"Alpha current flow betweenness centrality"**, Conference proceedings: 10th Workshop on Algorithms and Models for the Web Graph, WAW2013, 15-16 December, 2013, Harvard University (arXiv:1308.2591v1 [cs.SI], 2013)

[17] P2.5 L.Ostroumova, K.Avrachenkov, , N. Litvak, **"Quick detection of popular entities in large directed networks"**, submitted to Computer Science Conference, Oct 2013

[18] P2.6 P. van der Hoorn, N. Litvak, **"Degree-degree correlations in directed networks with heavy-tailed degrees"**, submitted Oct arXiv:1310.6528[math.PR] (2013)

[31] P4.7 P.Boldi and S.Vigna. **"In-core computation of geometric centralities with HyperBall: a hundred billion nodes and beyond"** to appear in the Proceedings of 2013 IEEE 13th International Conference on Data Mining Workshops (ICDMW 2013), (arXiv:1308.2144, 2013)

NADINE DELIVERABLE D2.1.

It is based on milestones M2, M3, M6(in progress) , M11(in progress) with deliverable publications:

[4] P1.4 K.M.Frahm, A.D.Chepelianskii and D.L.Shepelyansky, **"PageRank of integers"**, J. Phys. A: Math. Theor. v.45, p.405101 (2012) (arXiv:1205.6343[cs.IR], 2012)

[5] P1.5 K.M.Frahm and D.L. Shepelyansky **"Google matrix of Twitter"**, Eur. Phys. J. B v.85, p.355 (2012) (arXiv:1207.3414[cs.SI], 2012)

[6] P1.6 L.Ermann, K.M.Frahm and D.L. Shepelyansky **"Spectral properties of Google matrix of Wikipedia and other networks"**, Eur. Phys. J. B v.86, p.193 (2013) (arXiv:1212.1068 [cs.IR], 2012)

[7] P1.7 V.Kandiah and D.L.Shepelyansky, **"Google matrix analysis of DNA sequences"**, PLOS One v.8(5), p. e61519 (2013) (arXiv:1301.1626[q-bio.GN], 2013)

[8] P1.8 Y.-H.Eom, K.M.Frahm, A.Benczur and D.L. Shepelyansky, **"Time evolution of Wikipedia network ranking"**, submitted Eur. Phys. J. B (2013) (arXiv:1304.6601 [physics.soc-ph], 2013

[11] P1.11 K.M.Frahm and D.L. Shepelyansky, **"Poincare recurrences and Ulam method for the Chirikov standard map"**, Eur. Phys. J. B v.86, p.322(2013) (arXiv:1302.2761 [nlin.CD] , 2013

[12] P1.12 K.M.Frahm, Y.-H.Eom and D.L. Shepelyansky, **"Google matrix of the citation network of Physical Review"**, submitted to Phys. Rev. E Oct 21, 2013 (arXiv:1310.5624 [physics.soc-ph], 2013)

[

NADINE DELIVERABLE D3.1.

It is based on milestones M3, M5, M12(in progress), M12(in progress) with deliverable publications:

[3] P1.3 V.Kandiah and D.L.Shepelyansky, **"PageRank model of opinion formation on social networks"**, Physica A v.391, p.5779 (2012) (arXiv:1204.3806v1 [physics.soc-ph], 2012)

[6] P1.6 L.Ermann, K.M.Frahm and D.L. Shepelyansky **"Spectral properties of Google matrix of Wikipedia and other networks"**, Eur. Phys. J. B v.86, p.193 (2013) (arXiv:1212.1068 [cs.IR], 2012

[9] P1.9 L.Chakhmakhchyan and D.L. Shepelyansky, **"PageRank model of opinion formation on Ulam networks"**, submitted to Phys. Lett. A (2013) (arXiv:1305.7395 [nlin.CD], 2013)

[12] P1.12 K.M.Frahm, Y.-H.Eom and D.L. Shepelyansky, **"Google matrix of the citation network of Physical Review"**, submitted to Phys. Rev. E Oct 21, 2013 (arXiv:1310.5624 [physics.soc-ph], 2013)

[19] P3.1 R.Pavlovics, and A.A.Benczur, **"Temporal influence over the Last.fm social network"**, The 2013 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining, ASONAM 2013 Niagara Falls, Canada, August 25-28, 2013

[25] P4.1 L.Backstrom, P.Boldi, M.Rosa, J.Ugander, and S.Vigna. **"Four degrees of separation"**, ACM Web Science 2012: Conference Proceedings, pages 45-54, ACM Press (2012); best paper award, highlighted by New York Timse; (arXiv:1111.4570, 2012)

[26] P4.2 P.Boldi and S.Vigna. **"Four degrees of separation, really"** 2012 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2012), IEEE, 2012: 1222-1227 (arXiv:1205.5509, 2012)

[27] P4.3 P.Boldi, M.Rosa, **"Arc-Community Detection via Triangular Random Walks"**, LA-WEB 2012: 48-56 (2012)

[28] P.4.4 P.Boldi, M.Rosa, S.Vigna, **"Robustness of social and web graphs to node removal"**, Social Network Analysis and Mining, Springer: 1-14 (2012)

[29] P.4.5 P.Boldi, F.Bonchi, A.Gionis, T.Tassa, **"Injecting Uncertainty in Graphs for Identity Obfuscation"**, PVLDB 5(11): 1376-1387 (2012)

[30] P4.6 P.Boldi and S.Vigna. **"Axioms for centrality"** accepted for publications on Internet Mathematics (arXiv:1205.5509, 2012)

NADINE DELIVERABLE D4.1.

It is based on milestones M4, M7(in progress), M8(in progress). M13(in progress), with deliverable publications:

[2] P1.2 L.Ermann and D.L. Shepelyansky **"Ecological analysis of world trade"**, Phys. Lett. A v.377, p.250 (2013) (arXiv:1201.3584[q-fin.GN], 2012)

[10] P1.10 Y.-H.Eom and D.L. Shepelyansky, **"Highlighting entanglement of cultures via ranking of multilingual Wikipedia articles"**, PLoS ONE v.8(10), p.e74554 (2013) (arXiv:1306.6259 [cs.SI], 2013)

[20] P3.2 A.Garzo, B.Daroczy, T.Kiss, D.Siklosi, and A.A.Benczur, **"Cross-Lingual Web Spam Classification"**, The 3rd Joint WICOW/AIRWeb Workshop on Web Quality in conj. WWW 2013, Rio de Janeiro, Brasil. May 13 (2013), Proceedigs of the 22nd international conference on World Wide Web companion

[21] P3.3 M.Erdelyi, A.A.Benczur, B.Daroczy, A.Garzo, T.Kiss and D.Siklosi, **"The classification power of Web features"**, Internet Mathematics, to appear (2013)

[23] P3.5 A.Garzo, A.A.Benczur, C.I.Sidlo, D.Tahara, E.F.Wyatt, **"Real-time streaming mobility analysis"**, Conference: IEEE Big Data 2013

NADINE DELIVERABLE D5.1.

It is based on milestones M7(in progress), M9(in progress), M14(in progress) with deliverable publications:

[8] P1.8 Y.-H.Eom, K.M.Frahm, A.Benczur and D.L. Shepelyansky, **"Time evolution of Wikipedia network ranking"**, submitted Eur. Phys. J. B (2013) (arXiv:1304.6601 [physics.soc-ph], 2013)

[21] P3.3 M.Erdelyi, A.A.Benczur, B.Daroczy, A.Garzo, T.Kiss and D.Siklosi, **"The classification power of Web features"**, Internet Mathematics, to appear (2013)

[22] P3.4 J.Gobolos-Szabo, and A.A.Benczur, **"Temporal Wikipedia search by editr and linkage"**, SIGIR 2013 Workshop on Time-aware Information Access, 28 July - 1 August 2013, Dublin, Ireland

[32] P4.8 P.Boldi, A.Marino, M.Santini and S.Vigna. **"BUbiNG: massive crawling for the masses"** submitted for publication, Oct 2013