

REPORT DOCUMENTATION PAGE			Form Approved OMB NO. 0704-0188		
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1. REPORT DATE (DD-MM-YYYY) 06-04-2018		2. REPORT TYPE Final Report		3. DATES COVERED (From - To) 15-Sep-2015 - 31-Aug-2017	
4. TITLE AND SUBTITLE Final Report: Models and Metrics for Composite Socio-Spatial Networks			5a. CONTRACT NUMBER W911NF-15-1-0599		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER 611102		
6. AUTHORS			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAMES AND ADDRESSES University of Pittsburgh 123 University Place B21 UCLUB Pittsburgh, PA 15213 -2303			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES) U.S. Army Research Office P.O. Box 12211 Research Triangle Park, NC 27709-2211			10. SPONSOR/MONITOR'S ACRONYM(S) ARO		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S) 67192-NS-YIP.7		
12. DISTRIBUTION AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:		17. LIMITATION OF ABSTRACT		15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU	UU		Konstantinos Pelechrinis
					19b. TELEPHONE NUMBER 412-624-9417

RPPR Final Report
as of 18-Apr-2018

Agency Code:

Proposal Number: 67192NSYIP

Agreement Number: W911NF-15-1-0599

INVESTIGATOR(S):

Name: Konstantinos Pelechrinis

Email: kpele@pitt.edu

Phone Number: 4126249417

Principal: Y

Organization: **University of Pittsburgh**

Address: 123 University Place, Pittsburgh, PA 152132303

Country: USA

DUNS Number: 004514360

EIN: 250965591

Report Date: 30-Nov-2017

Date Received: 06-Apr-2018

Final Report for Period Beginning 15-Sep-2015 and Ending 31-Aug-2017

Title: Models and Metrics for Composite Socio-Spatial Networks

Begin Performance Period: 15-Sep-2015

End Performance Period: 31-Aug-2017

Report Term: 0-Other

Submitted By: Konstantinos Pelechrinis

Email: kpele@pitt.edu

Phone: (412) 624-9417

Distribution Statement: 1-Approved for public release; distribution is unlimited.

STEM Degrees: 1

STEM Participants:

Major Goals: The goal of this project has been to explore the use of tensor theory in analyzing heterogeneous networks. In particular, how can we use tensor theory to develop metrics for heterogeneous networks that do not rely on network projections and hence, ignore (potentially important) information.

Accomplishments: During the project we were able to better understand the abilities of tensors in analyzing heterogeneous networks. In particular, we started by analyzing spatio-temporal networks between two different time periods and we designed a tensor-based method for identifying distinguishing patterns between the two different networks. This can have implications in studying temporal changes in heterogeneous networks.

Furthermore, we have used linear algebra techniques to identify latent patterns in spatio-temporal data. We are currently extending this method to tensor analysis to multi-layer (heterogeneous) networks, with the goal of obtaining a network embedding for heterogeneous networks.

The work summarized above has resulted in: 4 conference/workshop papers, 1 journal (in press) and 1 book chapter.

Training Opportunities: Nothing to Report

Results Dissemination: The work has been disseminated through 4 conference/workshop publications, 1 journal publication and 1 book chapter.

Honors and Awards: Nothing to Report

Protocol Activity Status:

Technology Transfer: Nothing to Report

PARTICIPANTS:

Participant Type: Graduate Student (research assistant)

Participant: Ke Zhang

Person Months Worked: 3.00

Funding Support:

Project Contribution:

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International Collaboration:
International Travel:
National Academy Member: N
Other Collaborators:

Participant Type: Graduate Student (research assistant)

Participant: Sara Darei

Person Months Worked: 3.00

Funding Support:

Project Contribution:

International Collaboration:

International Travel:

National Academy Member: N

Other Collaborators:

CONFERENCE PAPERS:

Publication Type: Conference Paper or Presentation

Publication Status: 1-Published

Conference Name: IEEE CAMSAP

Date Received: 14-Aug-2016

Conference Date: 13-Dec-2015

Date Published: 13-Dec-2015

Conference Location: Cancun, Mexico

Paper Title: Location Based Social Network Analysis Using Tensors and Signal Processing Tools

Authors: Evangelos Papalexakis, Konstantinos Pelechrinis, Christos Faloutsos

Acknowledged Federal Support: **Y**

Publication Type: Conference Paper or Presentation

Publication Status: 3-Accepted

Conference Name: AAI ICWSM

Date Received: 14-Aug-2016

Conference Date: 17-May-2016

Date Published: 17-May-2016

Conference Location: Cologne, Germany

Paper Title: EigenTransitions with Hypothesis Testing: The Anatomy of Urban Mobility

Authors: Ke Zhang, Yuru Lin, Konstantinos Pelechrinis

Acknowledged Federal Support: **Y**

Publication Type: Conference Paper or Presentation

Publication Status: 3-Accepted

Conference Name: Workshop on Information Networks

Date Received: 14-Aug-2016

Conference Date: 02-Oct-2015

Date Published: 02-Jan-2015

Conference Location: NY, NY

Paper Title: GeoTense: Spotting Patterns in Geo-Social Networks with Tensors

Authors: Evangelos Papalexakis, Konstantinos Pelechrinis, Christos Faloutsos

Acknowledged Federal Support: **Y**

Publication Type: Conference Paper or Presentation

Publication Status: 1-Published

Conference Name: Workshop on Information Networks

Date Received: 14-Aug-2016

Conference Date: 02-Oct-2015

Date Published: 02-Oct-2015

Conference Location: NY, NY

Paper Title: Assortativity Patterns in Multidimensional Attributed Networks: a Statistical Approach

Authors: Konstantinos Pelechrinis, Marios Kokkodis, Dong Wei

Acknowledged Federal Support: **Y**

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In addition to the information provided within the report form here are the publications:

- E. Papalexakis, K. Pelechrinis and C. Faloutsos, “Location Based Social Network Analysis Using Tensors and Signal Processing Tools”, in IEEE CAMSAP, Cancun, Mexico, December, 2015.
- K. Zhang, Y. R. Lin and K. Pelechrinis, “EigenTransitions with Hypothesis Testing: The Anatomy of Urban Mobility”, in AAAI ICWSM, Cologne, Germany, 2016.
- K. Pelechrinis, E. Papalexakis and C. Faloutsos, “SportsNetRank: Network- based Sports Team Ranking”, in ACM SIGKDD Workshop on Large-Scale Sports Analytics ’16, San Francisco, August, 2016.
- X. Wen, Y. Lin and K. Pelechrinis, “PairFac: Event Analytics through Discriminant Tensor Factorization”, in ACM CIKM ’16, Indianapolis, IN, October, 2016.
- X. Wen, Y. Lin and K. Pelechrinis, “Event Analytics with Discriminant Tensor Factorization”, in ACM Transactions on Knowledge Discovery from Data (TKDD) – in press.
- K. Pelechrinis and Y.R. Lin, “Tensor-based Analysis for Urban Networks”, in Encyclopedia of Social Network Analysis and Mining (to appear)