

# Descriptive Network Modeling and Analysis for Investigating User Acceptance in a Learning Management System Context

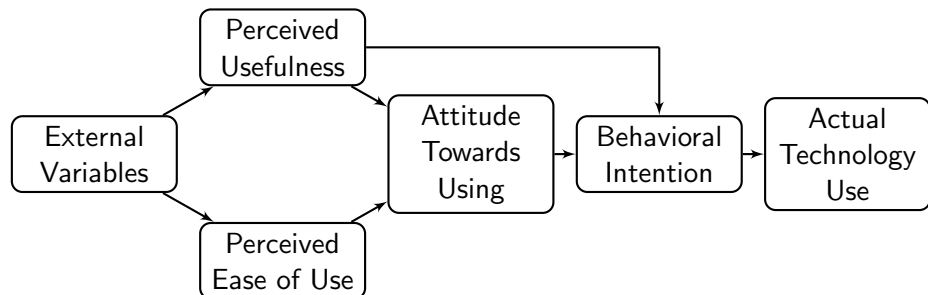
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LWDA 2019

- Acceptance Level of LMSs using Technology Acceptance Model (TAM)
- Methods
  - [Descriptive Analysis] Basic statistical analysis
  - [Network Analysis] Degree centrality and Motifs
- Descriptive Analysis
  - Student satisfaction with the usage as a whole
- Degree centrality
  - Level of variability of the different networks for the individual questions
- Motifs
  - Specific patterns of satisfaction levels for the different networks

# Technology Acceptance Model (TAM)



# Technology Acceptance Model (TAM)

**Perceived Usefulness (PU)** The degree to which individuals believe that using the system would enhance their job performance

**Perceived Ease of Use (PEU)** The degree to which individuals believe that using the system would be free of physical and mental effort

**Behavioral Intention to use the Technology (BIT)** The users interest in using the system

**Attitude Towards Using the Technology (ATUT)** The individuals view towards using the system

**Actual Technology Use (ATU)** The degree to which the system can meet the users needs

- Technology Acceptance Model (TAM) was developed to model the individuals choice of adopting technology
- Previous studies on TAM shows that there is a substantial relationship between PU and PEU (Cowen, 2009)
- Most previous studies investigated the impact of demographics on TAM contexts:
  - There is no considerable correlation between users demographics and PU (Raman., 2011; Shen et al., 2015)
  - The greater the age of users, the greater their understanding of usefulness of the innovation ( Dias et al., 2014; Kurkinen, 2013)
- Important: include descriptive network analysis of the model from the students perspective to determine which properties of LMS have a large impact on user satisfaction

- What is the current extent of Blackboard acceptance as an LMS?
- What is the level of students satisfaction considering the use of LMS?
- How descriptive network analysis methods can be used to extract understandable patterns of users acceptance?
- Which patterns can we identify based on statistical as well as network-based methods?

On-going research:

- How generally applicable are the results?

- 51 Pre-master students
- Tilburg School of Humanities and Digital Sciences
- 2018–2019 (fall and winter quarters)
- Data collected using a survey in the shape of closed-ended questions

## Questionnaire 1: Demographic Information

- Gender
- Age
- School

## Questionnaire 2: TAM Items

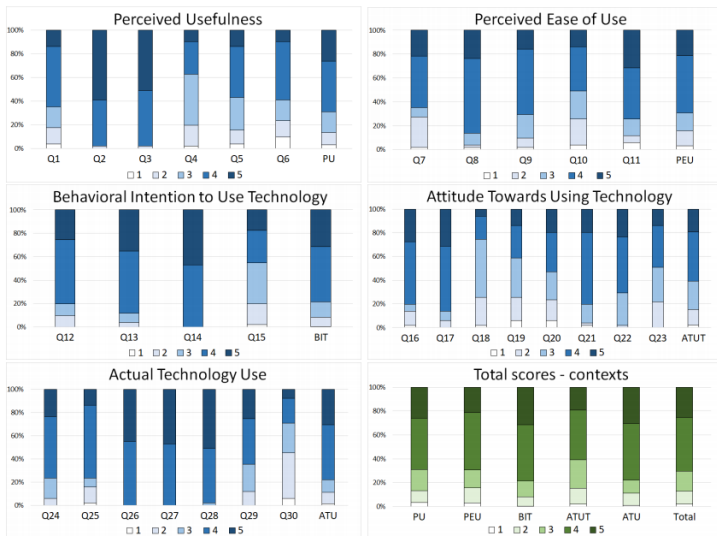
- PU: Q1 – Q6
- PEU: Q7 – Q11
- BIT: Q12 – Q15
- ATUT: Q16 – Q23
- ATU: Q24 – Q30



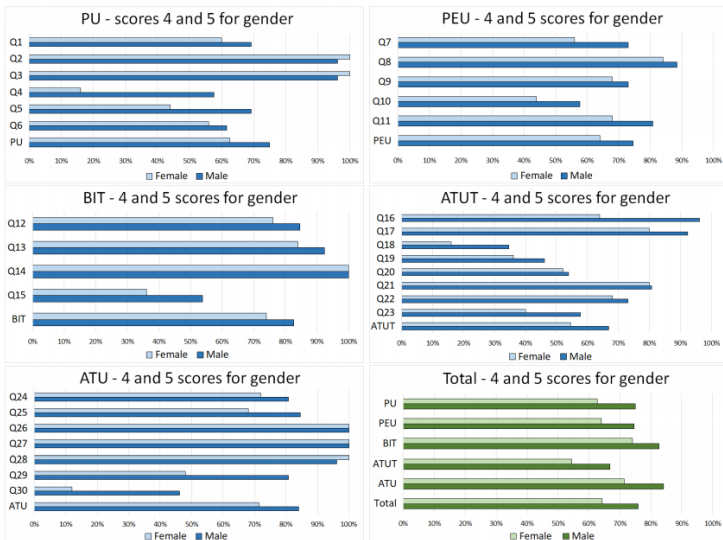
# Dataset: List of Questions

| Q   | Description   |      |  |
|-----|---|------|--|
| PU  |   |      |  |
| Q1  | Blackboard (BB) helps me to increase my learning productivity | ATUT |  |
| Q2  | BB helps me to find the course materials                      | Q16  | I use BB w/out any compulsion from anyone                          |
| Q3  | BB helps me to submit the assignments                         | Q17  | I need BB  |
| Q4  | BB increases my academic performance                          | Q18  | I am happy when I use BB   |
| Q5  | BB helps me in the learning process                           | Q19  | Using BB to submit the assignment is an innovative idea            |
| Q6  | BB helps me to ask and discuss some topics w/ the lecturer    | Q20  | Using BB to download the course materials is an innovative idea    |
| PEU |   | Q21  | Using BB to discuss w/ lecturer/fellow students is a positive idea |
| Q7  | BB is easy to operate   | Q22  | Using BB is good and wise decision                                 |
| Q8  | BB uses understandable language                               | Q23  | I am going to encourage my fellow students to use BB               |
| Q9  | BB uses the appropriate background color and font             | ATU  |  |
| Q10 | BB has a systematic menu                                      | Q24  | I use BB to support the learning activities                        |
| Q11 | BB is accessible, from w/in and outside of the university     | Q25  | I always access BB every day                                       |
| BIT |   | Q26  | I get the course materials from BB                                 |
| Q12 | I have an intention to use BB every day                       | Q27  | I download and upload assignments through BB                       |
| Q13 | I have an intention to check the latest materials on BB       | Q28  | I use BB to check my grades  |
| Q14 | I have an intention to check my grade through BB              | Q29  | I am satisfied using BB  |
| Q15 | I have an intention to encourage my fellow students to use BB | Q30  | I tell my fellow students about my satisfaction using BB           |

# Statistical Data Analysis (Individual/ Questions)

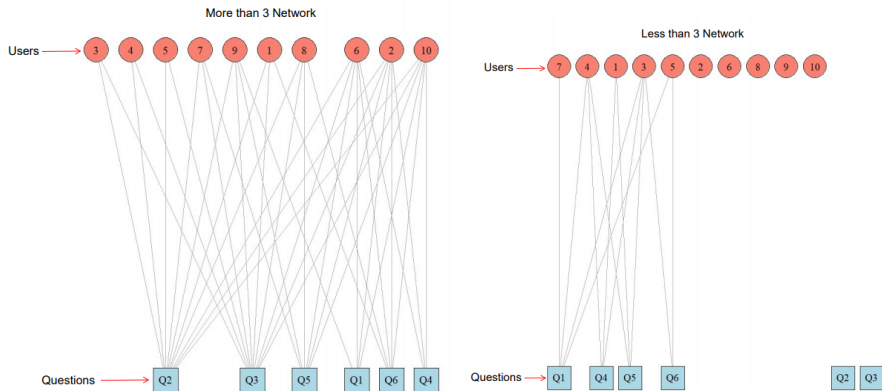


# Statistical Data Analysis



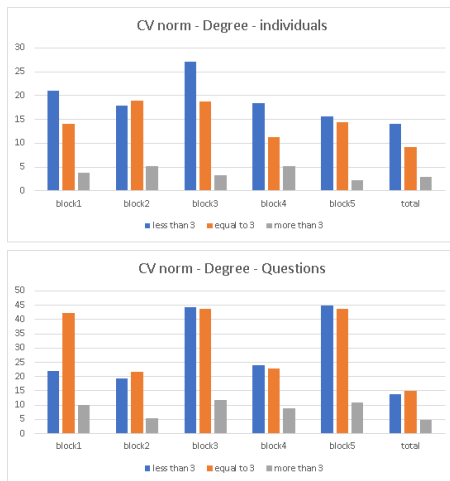
Positive answers (scores 4 or 5) by gender

# Network Modeling and Analysis (Degree Centrality)



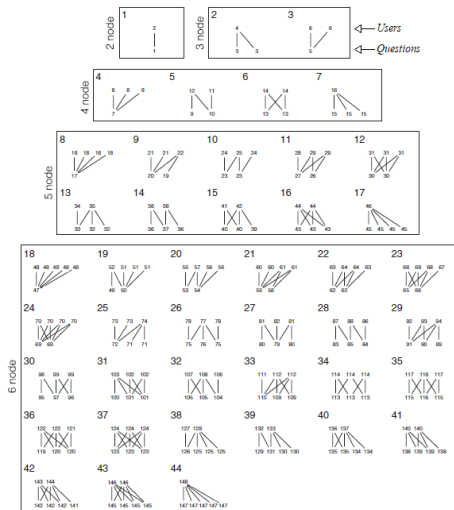
Overview of considered network (User/ Question)

# Network Modeling and Analysis (Degree Centrality)

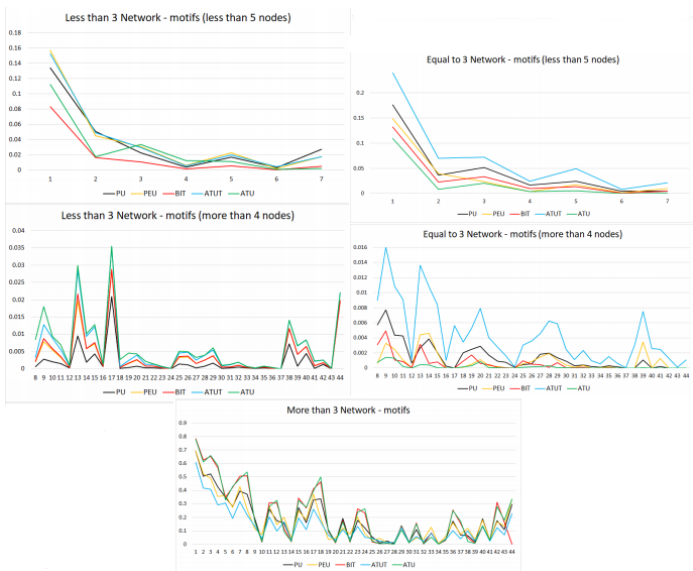


Normalized coefficient of variation of the degree centrality distribution on Users/Questions

# Overview of considered network motifs



# Network Modeling and Analysis (Motifs)



Relative Motif Frequencies on User/Question Networks

- Statistical analysis
  - Most scores are positive
  - Little difference between male and female students degree of satisfaction
- Degree Centrality
  - Equal to 3/ Less than 3: more variability
  - More than 3: less variability
  - High relative frequency of 4 and 5 scores (as found in the descriptive statistics)
- Motifs
  - Equal to 3/ Less than 3: low scores
  - More than 3: high scores
  - The prevalence of high score answers for motifs 4 and 5 (similar results as above)



- Most previous work uses more demographic information
  - Intervention requires more demographics such as different level of education, different field of study, . . .
- In this survey, age is negligible
  - Between 51 participants, just 6 were 31-40, and only 1 was 41+.

- Analyze the acceptance of LMS (Blackboard) among students:
  - Statistical analysis
  - Descriptive network modeling (degree centrality and motifs)
- High score of five TAM variables (PU, PEU, BIT, ATUT, and ATU)
  - Consistent behaviour of participants
  - High acceptance of LMS

- Investigate the acceptance of LMS (Blackboard) using Technology Acceptance Model (TAM)
  - Descriptive statistics overall level of acceptance
  - Network Analysis in depth patterns
- The future work would be with a larger dataset and more demographic features

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