Universität Hamburg
Institute of Information Systems
Prof. Dr. Stefan Voß

Seminar on
Information Management
Winter Term 2020/2021

The seminar deals with selected topics related to Information Systems. Students will be given a comprehensive insight into new research-related topics in Information Systems. Therefore, the students should work on a selected topic in groups of twos or threes (max. 15 pages net for single persons (exceptional case) or groups of two people, max. 20 pages net for groups of three people) and present it as a homework and with a presentation. In order to connect students, reviews of the seminar papers of peers need to be prepared, too.

The seminar is held as a block course. Depending on your interests, you can start your homework during the semester break or in the first half of the semester.

The language of the seminar is English. The processing and presentation of the topics needs to be done in English. The topics are related to those research fields which could be further explored by writing a subsequent thesis at the Institute of Information Systems.

There are various topics to choose from. This list of topics as well as the information on the seminar organization will be presented at an introductory event at the beginning of July (see the overview of dates following the list of topics). During this kick-off event, to some extent the essential literature sections will also be made available as a suitable introduction to the individual topics. In order to enable the students to make an appropriate choice, more topics than necessary are proposed. There is also the option to submit your own topic suggestions. Topics directly related to an implementation are of particular interest. In case you want to choose such a topic, please contact us before the kick-off event (email to frank.schwartz@uni-hamburg.de).

The following list of topics is still under construction and will be modified until the kick-off-event if necessary. Currently it should give an idea about possible subjects, especially regarding to your own topic suggestions.

At the end of this document you will find an overview of important dates of the seminar as well as comments on the process.

PART I: OPTIMIZANTION IN LOGISTICS

Topic 1: Platoon Formation Problem for Connected Vehicles (Xiaoning Shi or Abtin Nourmohammadzadeh)

A truck in a platoon is a representative of generalized connected vehicles, which has its own attribute from the perspective of research orientation. A platoon of connected vehicles form up and/or disseminate from time to time during the trip, in order to implement their transportation tasks. From the perspective of industrial concerns, there are many practical issues to be addressed, e.g., velocity control, dynamic leader-follower form in the platoon. Therefore, although initiated by practitioners in logistics industry, some systematic management and research efforts on connected vehicles is needed.

Notes and Literature:

Industrial demo: Scania Nederland,
https://www.youtube.com/watch?v=X7vziDnNXEY#action=share

Tool of typesetting: LaTex, https://www.latex-project.org/

Programming language: Python 3, https://www.youtube.com/watch?v=_uQrJ0TkZlc

Potential model: Mean Field Game, and/or Collaborative Game Model

https://doi.org/10.1016/j.trc.2019.05.019

https://doi.org/10.1016/j.trpro.2018.12.212

https://doi.org/10.1016/j.procs.2019.04.101

https://link.springer.com/chapter/10.1007/978-3-319-49001-4_4

https://link.springer.com/chapter/10.1007/978-3-030-04070-3_15

Topic 2: Humanitarian Logistics - A Case of Jordan (Xiaoning Shi)

Humanitarian Aid provides not only logistics services carrying foods but also multiple choices of transactions. In this project, data is collected in Jordan. Geographic locations of fetching foods, as well as ways of transactions, i.e., cash, card, vouchers are distinguished.

To improve the effectiveness and efficiency of humanitarian aid, the United Nations is planning to further deploy drones carrying light weight stuffs, and to use other advanced technologies. In addition, transactions without cash, i.e., Cash Based Transfer (CBT), might influence behaviors of human and choice of food logistics modes, too.

Notes:

Industrial demo: The United Nations World Food Program, the United Nations Children's Fund,
https://www.youtube.com/watch?v=_yURGGlVqgA&feature=youtu.be

Tool of typesetting: LaTex, https://www.latex-project.org/

Programming language: Python 3, https://www.youtube.com/watch?v=_uQrJ0TkZlc

Potential model: Stochastic Programming

Topic 3: Multimodal Transport Matching Platform - A Comparison between Centralized Mechanism and Federated Mechanism (Xiaoning Shi)

Different modes of transport would need to interchange at some nodes of the overall transport networks. Platforms with convenient APPs have been arising in the logistics industry and mobility field. Mechanism of matching transport demands and service supplies can be designed as centralized, federated and decentralized. Comparison on different mechanisms would make sense to increase mutual benefits. A dataset has been collected from a port-initiated multimodal platform as a start/input to this project.

Notes:

Industrial demo: Hamburg Port Authority, https://www.youtube.com/watch?v=QDzPjmjmun8

Tool of typesetting: LaTex, https://www.latex-project.org/

Programming language: Python 3, https://www.youtube.com/watch?v=_uQrJ0TkZlc

Potential model: Minimum Spanning Tree Model.

Topic 4: Rotation Optimization for Railways (Abtin Nourmohammadzadeh)

This problem investigates the construction of rotations for individual units of rolling stock and, simultaneously, to schedule the composition of trains from these units. Vehicle rotation planning is the assignment of vehicles to trips of a given schedule and the concatenation of these trips to rotations.

Literature:

https://doi.org/10.1016/j.ejor.2017.03.068

https://doi.org/10.1287/trsc.1030.0076

https://doi.org/10.1002/0471781266.ch16

https://link.springer.com/article/10.1007/s10696-011-9096-1

https://doi.org/10.1016/j.ejor.2005.03.032

PART II: OPTIMIZANTION IN THE MARITIME SECTOR

Topic 5: Waterway Ship Scheduling Problem in the Era of Vessel Train (Xiaoning Shi)

The concept of Vessel Train can be regarded as specific 'Train at sea', which actually share similar problem settings with connected vehicles on road, and this project observes fundamental approach of analyzing the future scenario of operating connected vehicles taking into consideration of waterway features and tidal effect.

In addition, some performance indicators (safety and efficiency) in the process of facilitating Vessel Train is to be proposed and measured.

This project is a step, among others, towards connected ship and MASS (Maritime Autonomous Surface Ship). Equipment requirements, information system settings, and analytical tools are to be groomed so that connected ships can be realized in the era of smart shipping and digital transformation in the near future.

Notes:

Industrial demo: NOVIMAR, https://vimeo.com/263869758

Tool of typesetting: LaTex, https://www.latex-project.org/

Programming language: Python 3, https://www.youtube.com/watch?v=_uQrJ0TkZlc

Potential model: Quadratic Assignment Problem

Topic 6: Data Fusion and Positioning Problem for the MASS and Connected Ships (Xiaoning Shi)

In the field of earth and ocean observing, especially for the foreseen deployment of MASS (Maritime Autonomous Surface Ship) and connected ships, sensor technology is widely applied as well as data fusion techniques.

Data collected by various sensors with specific features would build up different categories of data sources. There are mainly three categories of data sources, including satellites network, high frequency radar (HFR)systems and Radio Frequency Identification (RFID) systems, etc. Data fusion technologies facilitate data interchange among infrastructures and vehicles (moving items) operated along the coast, waterside, and in the deep ocean.

In this project, multi-sensor data fusion technique, i.e., game theoretic data fusion algorithm is investigated, followed by discussion regarding embrace some applications of data fusion and ocean data platform in the context of MASS and Connected Ships.

Notes:

Industrial demo: Kongsberg Gruppen, https://youtu.be/EF_wc1OmooE

Tool of typesetting: LaTex, https://www.latex-project.org/

Programming language: Python 3, https://www.youtube.com/watch?v=_uQrJ0TkZlc

Potential model: Game Theoretic Data Fusion Algorithm

Topic 7: Berth Allocations (Abtin Nourmohammadzadeh)

The berth allocation problem is an NP-complete problem in operations research, which deals with the allocation of berth space to vessels (ships) at container terminals. Vessels arrive over time and the terminal operator needs to assign them to berths to be properly served (loading and unloading containers) as soon as possible. Different factors affect the berth schedule of vessels.

Literature:

https://doi.org/10.1016/j.ejor.2019.11.055

https://doi.org/10.1016/j.cor.2019.01.017

https://doi.org/10.1016/j.ejor.2019.04.030

https://doi.org/10.1016/j.ejor.2019.03.036

https://doi.org/10.1016/j.tre.2017.07.006

https://doi.org/10.1016/j.apm.2016.05.004

Topic 8: Quay Crane Assignment (Abtin Nourmohammadzadeh)

This is another important problem at seaside container terminals. This involves the assignment of a set of available quay cranes, which are responsible to load or disembark containers to docking vessels (ships). This problem and berth allocation problem are very interrelated.

Literature:

https://doi.org/10.1016/j.eswa.2017.07.028

https://doi.org/10.1016/j.cie.2015.04.033

https://doi.org/10.1016/j.trc.2020.02.015

https://doi.org/10.1016/j.aei.2017.09.001

https://doi.org/10.1016/j.tre.2016.10.011

Topic 9: Yard Storage (Abtin Nourmohammadzadeh)

Yard storage includes the determination of storage locations for containers to be transported from the disembarking points to, stored in, later retrieved from, and finally, transported to the embarking points with less effort and costs. Its challenge is due to the fact that containers which may have different retrieval times are stacked on each other, and regaining a container from underneath requires movements of the above containers.

Literature:

https://doi.org/10.1016/j.aei.2017.10.003

https://doi.org/10.1016/j.ejor.2018.05.007

https://doi.org/10.1016/j.ejor.2013.10.054

https://doi.org/10.1016/j.tre.2009.04.008

https://doi.org/10.1016/j.ejor.2008.08.019

PART III: QUALITY ISSUES

Topic 10: Comparison between Quality Awards (Abtin Nourmohammadzadeh)

The long-term survival and success of an organization depend on improved quality, productivity and customer service. Therefore, to improve competitiveness, a number of transnational and national quality awards are conceived. These awards are given to organizations based on their grades in some criteria. This research focuses on introducing and comparing these awards.

Literature:

https://www.emerald.com/insight/content/doi/10.1108/02656719610109999/full/html?skipTracking=true

https://www.emerald.com/insight/content/doi/10.1108/0265671121119937/full/html

https://www.emerald.com/insight/content/doi/10.1108/09544780110391675/full/html

https://www.emerald.com/insight/content/doi/10.1108/09544780210425874/full/html

https://www.emerald.com/insight/content/doi/10.1108/09544789810197819/full/html

Topic 11: Statistical Quality Control (Abtin Nourmohammadzadeh)

Statistical quality control refers to the use of statistical methods in the monitoring and maintaining of the quality of products and services. For example, one of the methods is acceptance sampling. It is used when a decision must be made to accept or reject a group of parts or items based on the quality found in a sample. Another method is known as statistical process control, which uses graphical displays called control charts to determine whether a process should be continued or adjusted to achieve the desired quality. Here the application of these methods to a case study is expected.

Literature:

Montgomery, Douglas C. (1997) Introduction to statistical quality control, Wiley, New York et. al.

PART IV: PUBLIC TRANSPORT

Topic 12: Delay Propagation in Public Transport (Stefan Voß)

Network-based systems are at the core of our every-day life. Whether it is electronic networking, electricity grids or transportation, we expect the networks to function properly and give us a feeling of safety and security. However, there may be disturbances. In this topic, we consider disturbances in the context of public transportation. Public transport in our sense refers to rail, bus, ferry and alike, whenever we are moving people especially in public mass transit and rail.

To classify and cope with disturbances, we find many words in literature that often are more or less loosely coupled, including robustness, resilience, vulnerability, disruption mitigation or delay management, just to mention a few. In a recent paper we surveyed related literature and put them into perspective. As a major insight different strands of literature exist that may benefit from becoming better connected and intertwined. In the advent of integrated problem settings, robustness can play a major role. In this topic we would like to investigate delay propagation.

Literature:

https://doi.org/10.1287/trsc.2017.0757

Amberg, Ba. (2017) Robuste Effizienz des Ressourceneinsatzes im öffentlichen Personennahverkehr, PhD thesis, Fachbereich Wirtschaftswissenschaft, Freie Universität Berlin.

PART V: MISCELLANEOUS

Topic 13: Interoperability in Smart Home Environments (Frank Schwartz)

The smart home market is characterized by a coexistence of multiple systems with very limited possibilities of interoperability. The market is mainly divided between the big players Amazon, Google and Apple who are responsible for the underlying frameworks and APIs. Therefore, they control which devices (and manufactures) are allowed to enter.

That obviously creates a hindrance to enter the smart home market for competitors because, unlike a phone and its associated system environment which may change more frequently, a smart home needs to stay functioning and compatible for much longer. At the end of 2019, Amazon, Apple, Google, and Zigbee Alliance formed a working group to address those issues with the project "Connected Home over IP".

An overview over the most used standards today should be given. Furthermore, options for interoperability that already exist should be investigated and a real-world implementation which showcases interoperability with multiple systems (e.g., Amazon Alexa and Apple Home Kit/Siri) should be presented.

Topic 14: Improving and Implementing Recommendation Algorithms for a Nutrition Startup (Xiaoning Shi)

(further information in consultation with the supervisor)

DATES

Registration phase (registration via STiNE):	Mon, June 1, 2020, 9:00 am – Wed, June 10, 2020, 1:00 pm
Allocation of left-over seats:	Thu, June 25, 2020 – Fri, June 26, 2020
Kick-off meeting and topic distribution (online):	Fri, July 3, 2020, 6:00 – 8:00 pm (Zoom meeting[1])
Feedback of topic choice (four topics with according priority):	Sat, July 4, 2020, 12:00 am to frank.schwartz@uni-hamburg.de
Outline discussions:	Upon appointment
Interim presentations of the work progress:	Upon appointment
Submission of 1st version of seminar thesis:	Mon, Nov 09, 2020, 12:00 am
Review phase including review submission:	Tue, Nov 10, 2020 – Fri, Nov 13, 2020, 12:00 am
Submission of final version of seminar thesis incl. **reply to reviews**:	Mon, Nov 30, 12:00 am
Presentations (online/offline (?), usually we do not need more than two appointments – nevertheless please block **all** dates and times):	Fri, Dec 04, 5:00 pm – 9:00 pm / Sat, Dec 05, 9:00 am – 6:00 pm / Sun, Dec 06, 9:00 am – 4:00 pm

CONTACT

Prof. Dr. Stefan Voß (seminar chair)	stefan.voss@hamburg.de
Julia Bachale (secretary)	iwi@uni-hamburg.de, 040 42838 3064
Dr. Abtin Nourmohammadzadeh (topic supervisor)	abtin.nourmohammadzadeh@uni-hamburg.de
Dr. Frank Schwartz (organizational issues)	frank.schwartz@uni-hamburg.de
Dr. Xiaoning Shi (topic supervisor)	xiaoning.shi@uni-hamburg.de

[1] Invitation link to join the Zoom meeting (meeting ID: 924 0992 1012, password: 05911509)
https://uni-hamburg.zoom.us/j/92409921012?pwd=ZXVFQ3dNU1hYSmptWFpQL254Q1hmdz09
Access by phone (with meeting ID and PW): +49 69 7104 9922, +49 30 5679 5800, +49 695 050 2596

COMMENTS ON THE COURSE OF THE SEMINAR

Submission of seminar paper 1st version:

The seminar paper (finished work, i.e., no draft or the like!) is to be submitted at this point in time only electronically (see below for instructions regarding file names), as an attachment to an e-mail which is to be sent to your supervisor as well as to the organizer of the seminar (Frank Schwartz).

The work will be submitted to the review process on the day of submission. This means that each seminar participant receives one paper to review. As far as possible, each paper will be evaluated at least as often as the group that wrote the paper has members. The review of the paper has to be done individually. It should be used a review template that can be downloaded from the Institute's website.[2]

Submission of reviews:

The reviews are to be returned in (important!) anonymized form – i.e., your name does not appear in the review – to your supervisor and to the organizer of the seminar in due time. After the name of the reviewer has been removed from the file name, the review will be forwarded to the authors of the reviewed paper. The authors must now carefully work through the submitted evaluations and either eliminate the points of criticism or - if they can give very good reasons for doing so - invalidate them as unfounded.

You must then document this entire revision process in written responses to the respective reviews.[3] At this point it should be clarified again that the work is to be proofread c a r e f u l l y and t h o r o u g h l y in all cases! This also includes considering your punctuation. If you are uncertain, please seek help from a competent source.

Submission of reply to reviews and final version:

The replies as well as the final version of the seminar paper must be sent to your supervisor as well as to the organizer of the seminar by e-mail in due time. In addition, your supervisor will promptly receive a copy of this final version on paper (to be handed in to the secretary, in person or slid through under the door of the respective supervisor[4]).

2 See <https://www.bwl.uni-hamburg.de/en/iwi/studium/lehrveranstaltungen/bachelorveranstaltungsinhalte/wintersemester/seminarim.html>

3 For each referee's report, a separate reply is prepared. This is done in such a way that the text of the referee's report is copied to a new document and in this document the replies are added to the original text. For a better visibility, these statements should be formatted in a different fashion than the referee's text.

4 The option with the door, however, only works with a slim binding technique; it does not work with a spiral binding, for example.

Preparation and submission of the presentation:

As soon as the seminar paper is completed, you should start preparing your presentation. Please note the following:

- Duration of a presentation: per group of 3 people: 45 minutes + 15 minutes discussion, group of 2 people or individual presentation: 30 minutes + 15 minutes discussion
- All group member present in equal shares
- Addressees: Seminar participants (choose the appropriate reception level!)
- Clearly introduce the topic as well as the speakers at the beginning with first and last names, present the structure of the presentation (Agenda)
- Keep a critical eye on the research, and also present your own theses/assessments, where appropriate
- Visual support:
  - Slides, online presentation, blackboard, handouts,...
  - Support the presentation especially by bullet points and diagrams
  - Complete sentences/texts only in exceptional cases (important definitions, quotations)
  - Appropriate form (font size, colors,...), font size must be tested in advance!
- Discussion of your own topic:
  - Moderation of the pursuing talk, answering questions, critical faculties
  - Don't interrupt questions
- Active participation in the discussion of other topics (quantity alone is not enough!)

You can also send your supervisor a preliminary version of your presentation up to three days before your expected presentation date, so that he or she can take a critical look at it again. You should also send your presentation to the organizer of the seminar at least immediately before the lectures, so that they are all available in time for the lecture as a backup.
The connection technology for the projection is VGA. If you have a different graphics connection on your computer, you will either have to bring an appropriate adapter yourself or we will use a computer from IWI, but of course, we will need your file (see above).

Evaluation of your work:

The grades are a combined evaluation of your seminar paper, your presentation, your participation in the discussion, your review and your replies to the reviews of your paper (each with different weightings); they are determined jointly by the different supervisors.

Naming schemes for file names (please adhere to them!) and e-mail transmission:

Seminar paper 1st version:
Thesis.v1.Topic <topic number>_<name abbreviation of the topic's supervisor>.<last name 1st group member>_<if relevant last name 2nd group member>_<if relevant last name 3rd group member>.<title of the thesis>.<document type>
Example:
Thesis.v1.Topic 02_XS.Humanitarian Logistics - A Case of Jordan.pdf

Review:
Review.Topic <reviewed topic number>_<name abbreviation of the topic's supervisor>.<reviewer's last name>.<document type>
Example:
Review.Topic 06_AN.Bartels.pdf

Response to review:
Reply.Topic <topic number>_<name abbreviation of the topic's supervisor>.<consecutive number for different referees' reports>.<document type>
Example:
Reply.Topic 06_AN.2.pdf

Seminar paper final version:
Thesis.final.Topic <topic number>_<name abbreviation of the topic's supervisor>.<last name 1st group member>_<if relevant last name 2nd group member>_<if relevant last name 3rd group member>.<title of the thesis>.<document type>
Example:
Thesis.final.Topic 02_XS.Humanitarian Logistics - A Case of Jordan.pdf

Presentation:
Presentation.Topic <topic number>_<name abbreviation of the topic's supervisor>.<last name 1st group member>_<if relevant last name 2nd group member>_<if relevant last name 3rd group member>.<title of the thesis>.<document type>
Examples:
Presentation.Topic 02_XS.Humanitarian Logistics - A Case of Jordan.pdf
Presentation.Topic 02_XS.Humanitarian Logistics - A Case of Jordan.pptx

All files should be submitted in PDF format. The presentation should also be submitted in the original format.

The subject of the e-mail in which a file is sent should include a reference to the topic or group for which the file is being submitted (e.g., the file name of the attached file).

E-mails with the above-mentioned files should always be sent to the organizer of the seminar (Frank Schwartz) as well as to the supervisor of the chosen topic.