



Anomaly Detection Seminar 2021/2022

Today

- Kick-Off
- Some Formal Stuff
- Short Overview of the Topics
- Choose a couple topics
 - Since we are only a few, you can make these requests quite complicated if you like (I prefer topic 1, but I would also take 3 or 7, except when I can do it in german, then I would prefer topic 12)
- Send your choice to Simon.Kluettermann@cs.tu-dortmund.de (till tomorrow 13.10.2021 23:59)
- You will be assigned one in the next days
- Earlier submission will not be preferred, so take your time



- This seminar is overbooked and there are dozens of students that we were not able to assign a seminar this semester
- Many of you are also not fulfilling the suggested requirements and should have time to hear a Seminar next year, while staying in regular study time.
- So if youre not sure that you want to participate in this course, please consider that you are taking the place of a potentially very motivated student!
- If you want to make place for another Student: No hard feelings, just write an email to Simon.Kluettermann@cs.tu-dortmund.de.

Objective of this Seminar

- Introduction to some fundamental research problems
 - Researching current scientific ideas
 - Understanding benefits and drawbacks of state-of-the-art techniques
 - Writing a clear and concise scientific report
 - Presenting and discussing your findings

→Great start for a final thesis.... →maybe just talk to your supervisor about this



Grading

- 1 Presentation in Class
 - 2 Writing of your Report
 - 3 Discussion of your Findings
- All parts required and graded equally

 - Everything will be done in english. If this is a problem for you, please write Simon.Kluettermann@cs.tu.dortmund.de



Tasks of this Seminar

- Required: willingless to learn something new
- Also useful: A basic understanding of machine learning, statistics and linear algebra
 - 1 Choose a couple of Topics from our list, you will be assigned to one of them
 - 2 Read and understand the Paper given to you
 - 3 Find, read and understand related literature. It is probably impossible to get a good picture about your Topic from just one Paper
 - 4 Critically analyze the suggested Ideas and compare them to the literature
- Final Results:
 - Presentation (30min +10min discussion)
 - Written Report (at least 6 Pages double column, ACM template)



Research Culture

This course is Research oriented

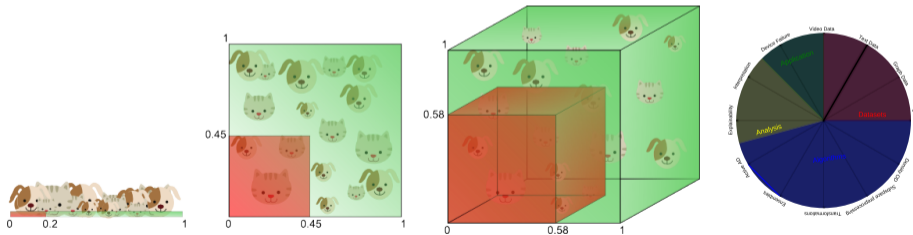
- Feel free to ask as many Questions as you want
- If you want to discuss your Topic with somebody, make an appointment with your Supervisor
- the same holds for your Presentation/Report
- Also any Feedback is always appreciated



Topic 1: High dimensional Data

A comprehensive survey of anomaly detection techniques for high dimensional big data (Thudumu et al, 2020)

Supervisor: Jelle Hüntelmann (jelle.hüntelmann@cs.uni-dortmund.de)

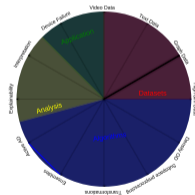


Topic 2: Text Data

Outlier Detection for Text Data (Kannan et al, 2017)

Supervisor: Simon Klüttermann (simon.kluettermann@cs.uni-dortmund.de)

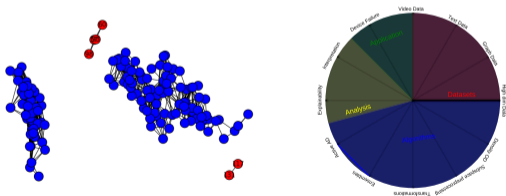
Subject	Sender	Date
check this out man...	Neida Romans	Thursday 14:59:37
Help me!	Oswald MANNING	Thursday 12:47:59
Have Arthritis pain? There is help for you.	Orsa	Thursday 03:45:36
down on her, and	Reginald Stubbs	Wednesday 06:02:05
natural enlargement	diane george	Tuesday 16:37:15
He Subject	Salim dickhaut	Monday 10:38:59
only Youngest have Shocking sexuality other	Kristie Slapp	Monday 01:07:32
Reduces stress	Yankie kim	06.02.2005 16:27
PERSONAL	esno2005	06.02.2005 04:56
We need to render the delight of having the finest	Clitilda Gadrungt	06.02.2005 02:10
Find more savings online	Kenneth draper	05.02.2005 22:30
fastest cheaper meds	Lidia White	05.02.2005 16:37
Breaking News	Dee H. Edwarded	05.02.2005 14:40
We have your wanted meds at low prices only.	Lucien hyatt	04.02.2005 06:59
100% zum erlinden__1679438	leel Rios	03.02.2005 03:34
Enjoy your wanted meds.	tracy wiliano	03.02.2005 02:28
Confirm Your Washington Mutual Online Banking	Washington Mutual On.	02.02.2005 22:03
out PINKADOLE SYSTEM, MAGROOMEDIA, SYMANTEEC, PC GAMES, ...	Vikene Ileen	02.02.2005 19:11
Finished	Cecilia Fuller	02.02.2005 05:57
You can save more thru ordering meds on our site.	mel sewick	02.02.2005 01:21
The most insane action	Katrina zznos	31.01.2005 16:48
You don't have to be fat, Noel	Kirsti	28.01.2005 20:22



Topic 3: Graph Data

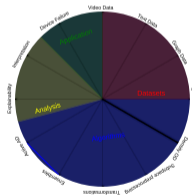
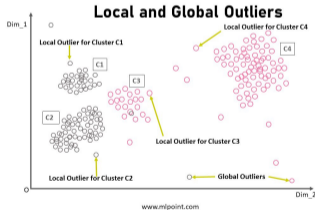
A Comprehensive Survey on Graph Anomaly Detection with Deep Learning (Ma et al, 2021)

Supervisor: Simon Klüttermann (simon.kluettermann@cs.uni-dortmund.de)



Topic 4: Density based Outlier Detection

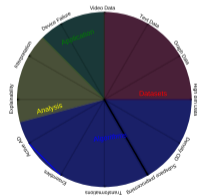
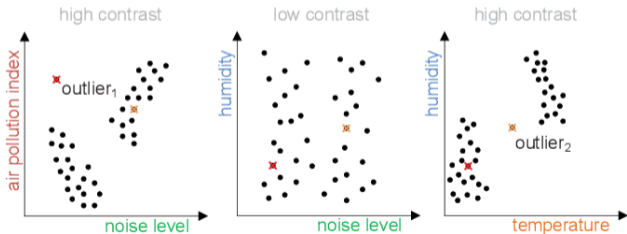
LOF: Identifying Density-Based Local Outliers (Breunig et al, 2000)
Supervisor: Daniel Wilmes (daniel.wilmes@cs.uni-dortmund.de)



Topic 5: Subspace preprocessing

HiCS: High Contrast Subspaces for Density-Based Outlier Ranking (Keller, Müller et al, 2012)

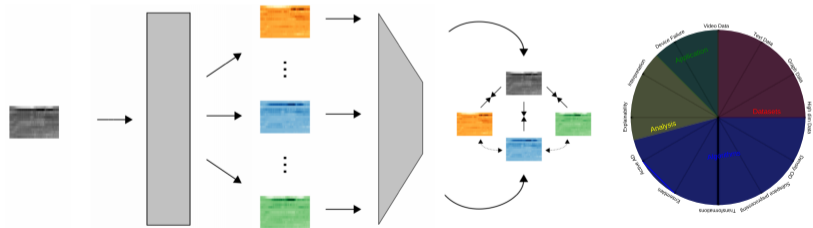
Supervisor: Daniel Wilmes (daniel.wilmes@cs.uni-dortmund.de)



Topic 6: Transformations for Anomaly Detection

Neural Transformation Learning for Deep Anomaly Detection Beyond Images (Qui et al, 2021)

Supervisor: Bin Li (bin.li@tu-dortmund.de)

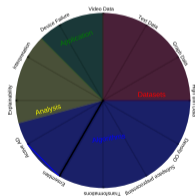
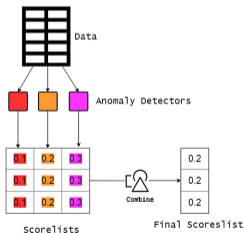


Topic 7: Anomaly Ensembles

Unsupervised Anomaly Detection Ensembles using Item Response Theory

(Kandanaarachchi1, 2021)

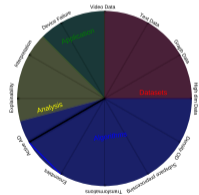
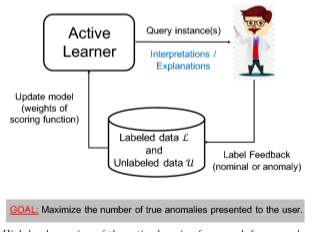
Supervisor: Simon Klüttermann (simon.kluettermann@cs.uni-dortmund.de)



Topic 8: Active Anomaly Detection

Active Anomaly Detection via Ensembles: Insights, Algorithms, and Interpretability
(Das et al, 2019)

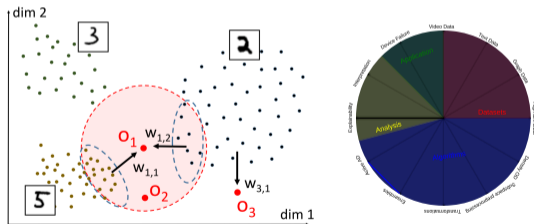
Supervisor: Simon Klüttermann (simon.kluettermann@cs.uni-dortmund.de)



Topic 9: Interpretation

Contextual Outlier Interpretation (Liu et al, 2017)

Supervisor: Benedikt Böing (benedikt.boeing@cs.uni-dortmund.de)

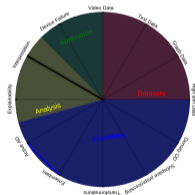
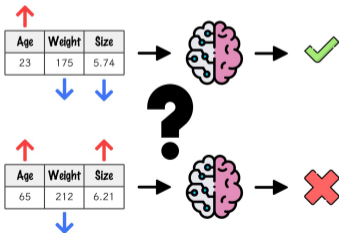


Topic 10: Explainability

Additive Explanations for Anomalies Detected from Multivariate Temporal Data

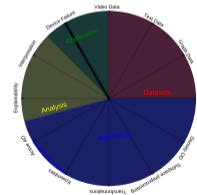
(Giurgiu, Schumann et al, 2019)

Supervisor: Chiara Balestra (chiara.balestra@cs.uni-dortmund.de)



Topic 11: Application: Interpretable Device Failure

Interpretable, Multidimensional, Multimodal Anomaly Detection with Negative Sampling for Detection of Device Failure (Sipple et al, 2020) **Supervisor:** Bin Li (bin.li@tu-dortmund.de)



Topic 12: Application: Video Data

Fast Unsupervised Anomaly Detection in Traffic Videos (Doshi et al, 2020) Supervisor: Jelle Hüntelmann (jelle.hüntelmann@cs.uni-dortmund.de)

