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HOCHSCHULE DARMSTADT
UNIVERSITY OF APPLIED SCIENCES

AUSTRIAN INSTITUTE OF TECHNOLOGY
TOMORROW TODAY

DISINFORMATION DETECTION:

AN EXPLAINABLE TRANSFER LEARNING APPROACH

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CODE 2021 – Science Track - Ph.D.Proposal

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ABOUT ME

Mina Schütz

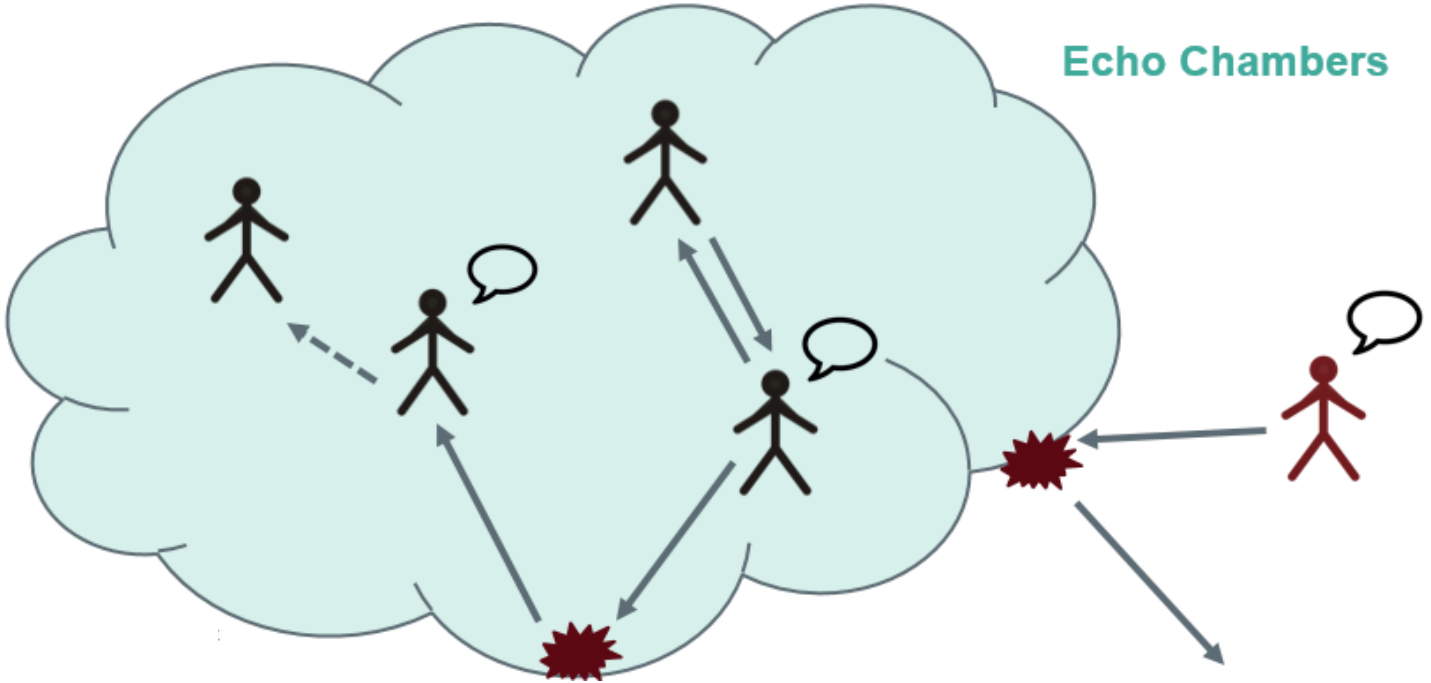
2020:	M.Sc. in Information Science (Darmstadt, University for Applied Sciences)
2019-2023:	M.Sc. + Ph.D. Student at Austrian Institute of Technology GmbH
2020-2025:	Doctorate at Darmstadt University (Applied Computer Sciences)

OUTLINE & KNOWLEDGE GAP

- **Disinformation detection** has **gained inreased focus** by research community
  - Fake News has an impact on **political** processes, **opinion** mining and **journalism**
  - **News consumption** mostly on **social media**
  - **Information overload**

- **Manual fact-checking** is **expensive** and **slow**
  - Many automatic detection techniques have been conducted, but **no final solution**
  - Often **only classification** without new insights & **black-box** models
  - **Less German datasets** available

FILTER BUBBLES



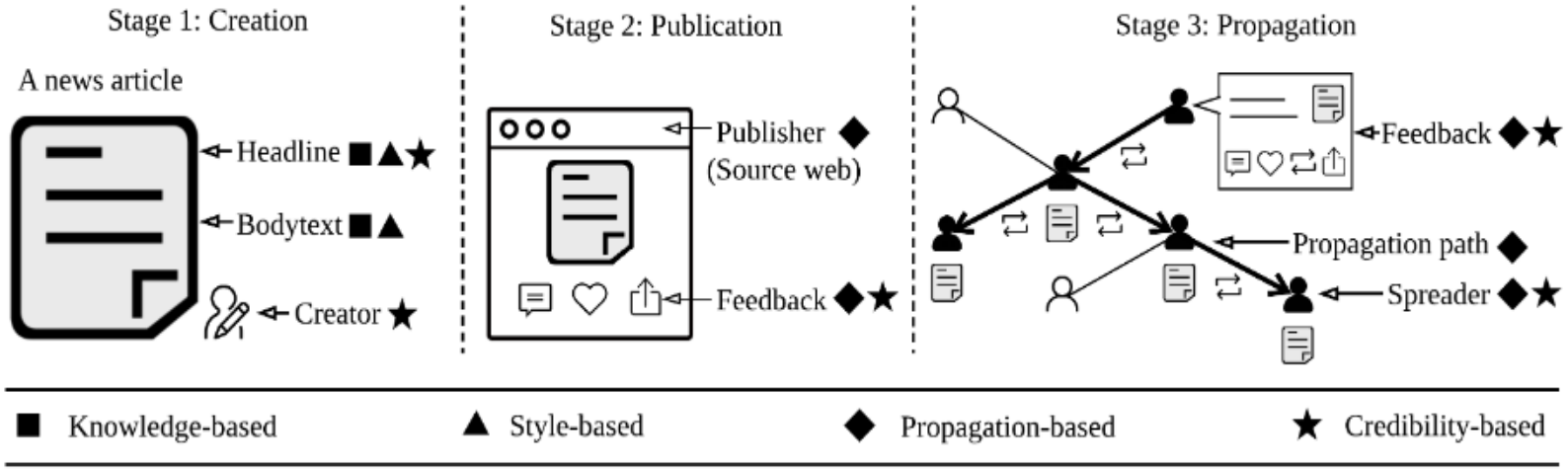
FAKE NEWS | DEFINITION

- **Defined by intention and factuality!**

- **Disinformation**
  - Intentional
  - Deceiving the reader
  - Propaganda, hoaxes, fabrications, rumors, clickbait

- **Misinformation**
  - Unintentional
  - For example: satire

DETECTION APPROACHES



RESEARCH QUESTIONS

To which extend can we obtain new linguistic knowledge about disinformation with natural language processing methods and visualization techniques?

- **Extraction of statements & narratives** (common context?)
- **Multi-lingual models** (predictions)
- **Explainable Artificial Intelligence** (XAI)
  - Visualizations
  - Breaking the black-box apart

- Generating a system **that helps users to identify misleading content**!

MAIN SCIENTIFIC CONTRIBUTION

- **Stand-alone** linguistic binary classification approaches **are not enough** to tackle the issue of fast spreading disinformation

- Diverse **dataset** in **German** (news articles & social media) & multi-lingual models

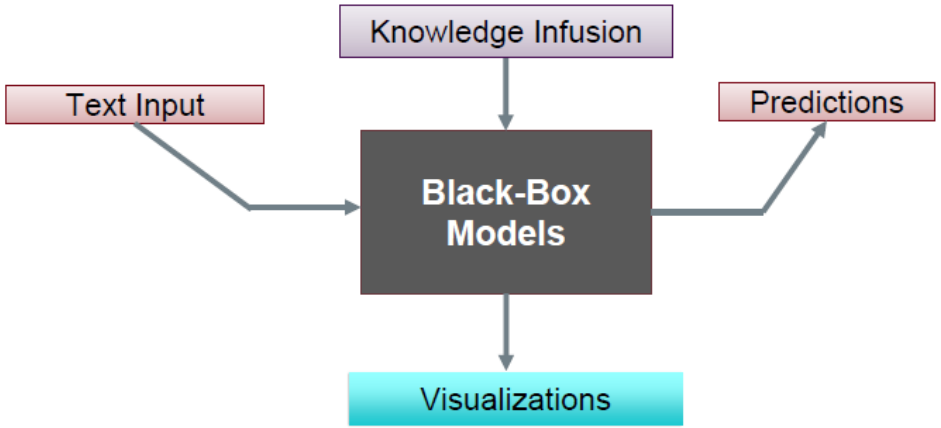
- **Combining** several **features to apply** approach for **other domains**
  - *Emotion, aggression, toxicity, sentiment*

- **Generalizability for multiple domains:**
  - False content, hate speech (sexism, racism..), conspiracy theories & propaganda

OUR APPROACH

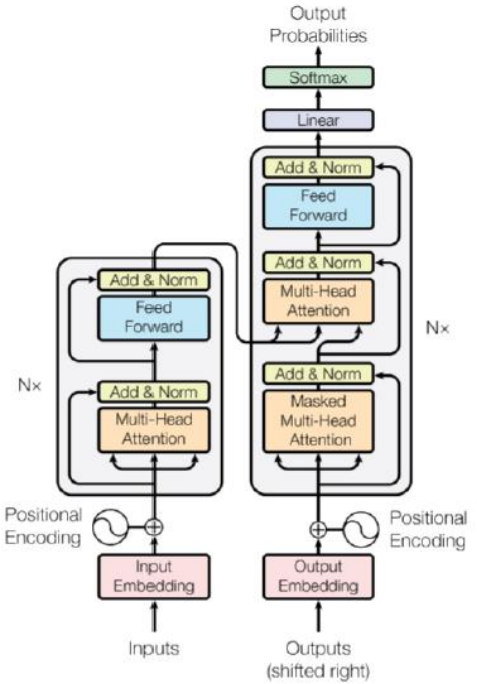
- **Explainable** AI for **understanding black-box** models & **interpreting** the **results**

- **Transfer Learning**
  - *claim* extraction & verification
  - *entity* extraction & relation
  - *event* detection



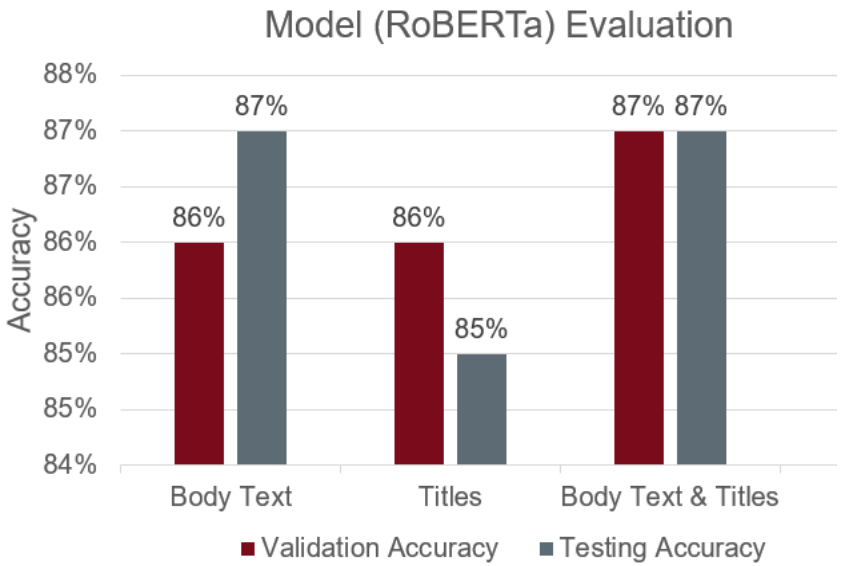
PRE-TRAINED LANGUAGE MODELS

- Latest innovation in language modeling: semi-supervised **Transformers**
- **Pre-trained** on **generic data**
- **Fine-tuned** with a dataset for the **specific task**
- **Sentence-** or **token-level-tasks**
- Using multi-head **attention**
- Architecture: **encoder** and **decoder**
- **Word embeddings** for tokenization



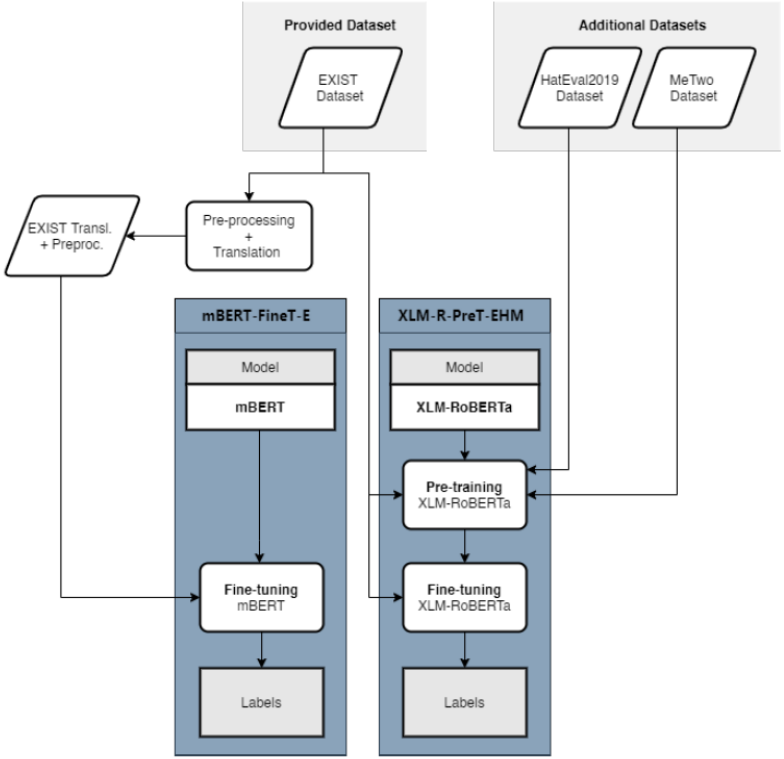
RESULTS SO FAR | MASTERTHESIS

- Binary automatic fake news classification
- 5 different Transformer
- Comparison on predictions between headlines and body text
- Evaluation of different preprocessing steps

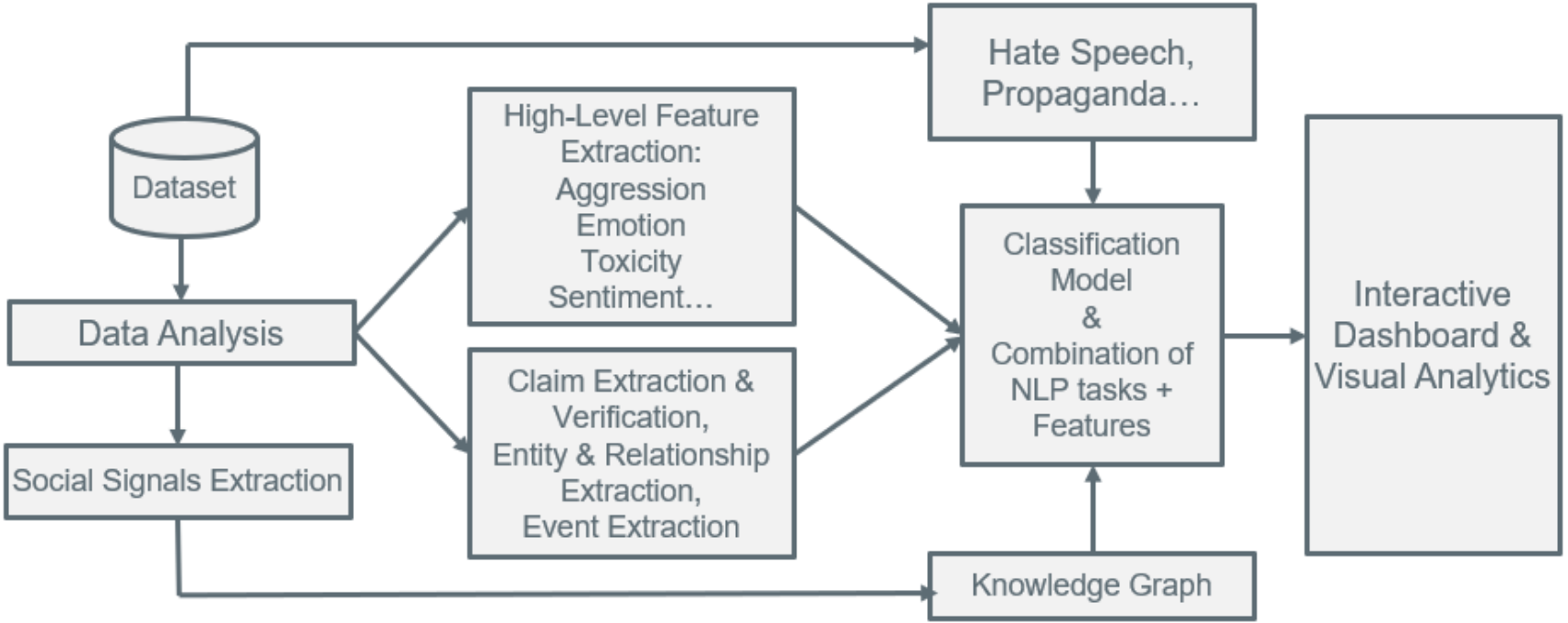


RESULTS SO FAR | EXIST2021

- Challenge on sexism detection
- Multi-class classification
- Different pre-training & fine-tuning strategies
- 3rd best team on task 1 (binary)
  - 77.52 macro-averaged F1-score

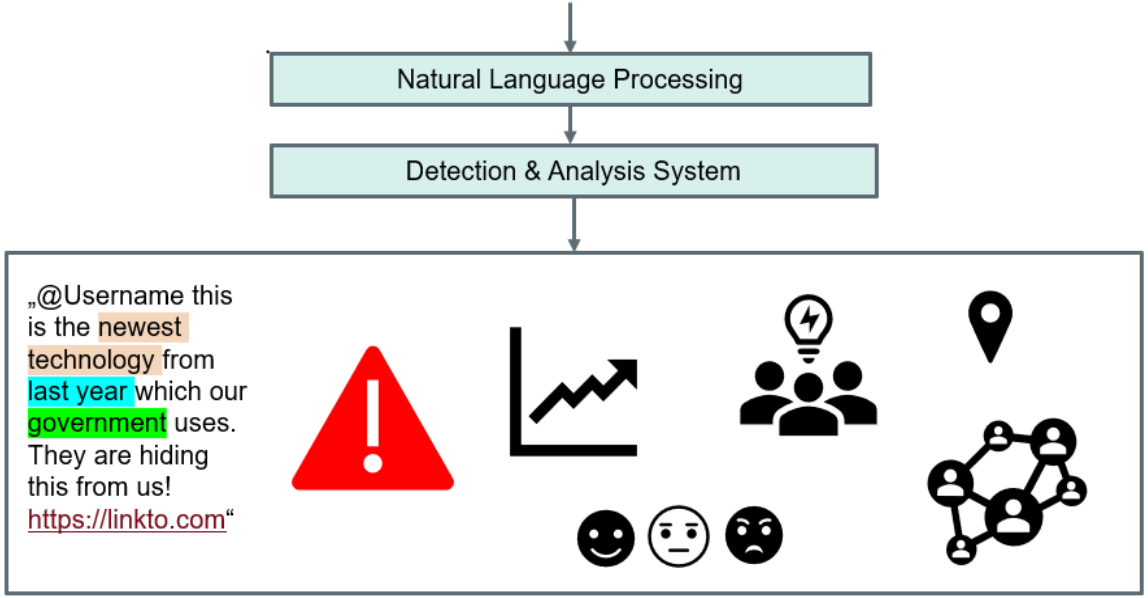


METHODOLOGY



OUTPUT

„@Username this is the newest technology from last year which our government uses. They are hiding this from us! https://linkto.com“



PROJECTS

University for Applied Sciences: DeTox (Hesse, Germany)

- „Detektion von Toxizität und Aggressionen in Postings und Kommentaren im Netz“
- Hate Speech, Toxicity, Aggression (Social Media content)
- Cybersecurity research funding of the Hessian Ministry of the Interior and Sports

Austrian Institute of Technology GmbH: Defalsif-AI (FFG KIRAS Austria)

- “Detection of false information via artificial intelligence”
- audio-visual media forensics, text analysis, and the fusion of these technologies with the help of AI

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THANK YOU!

Do you have any questions?

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