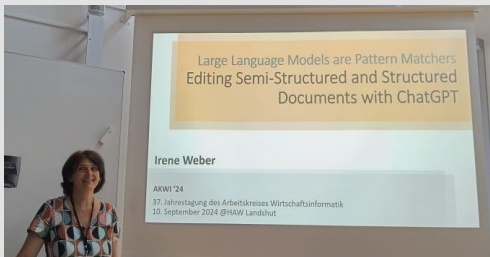


Large Language Models are Pattern Matchers Editing Semi-Structured and Structured Documents with ChatGPT

Irene Weber



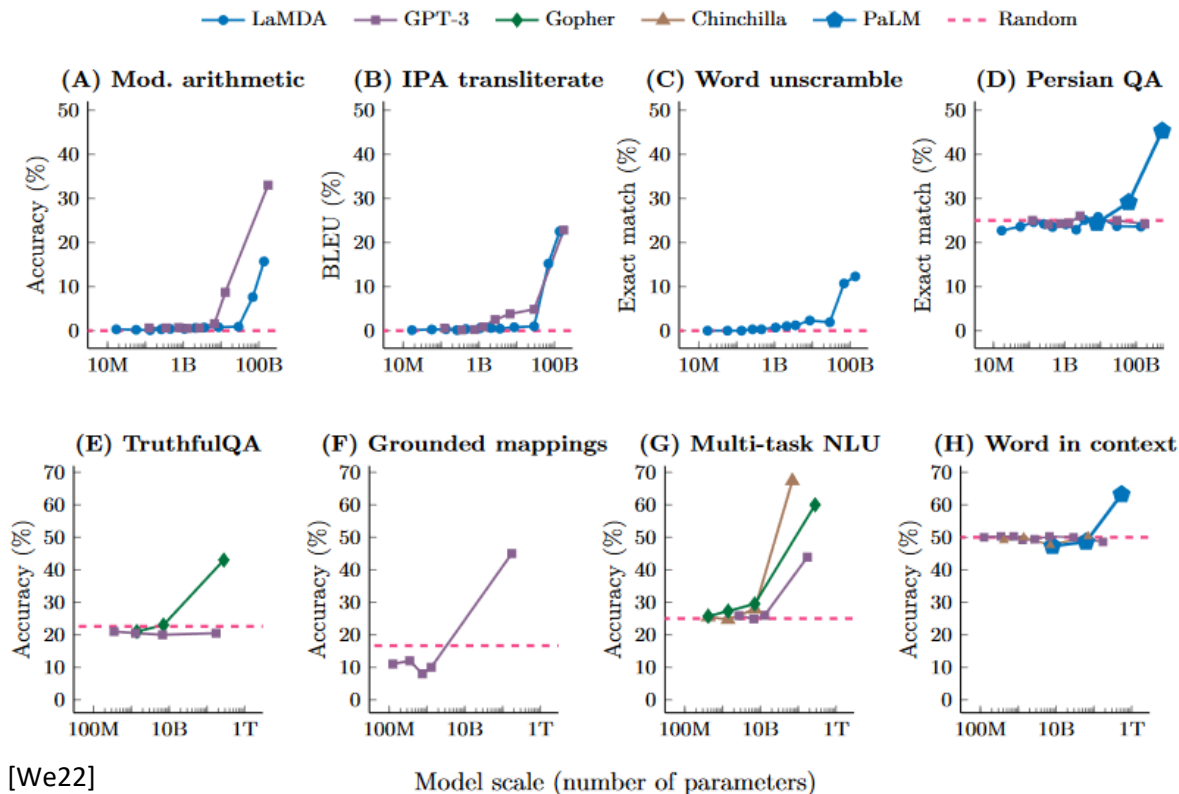
AKWI '24

37. Annual Conference of Arbeitskreis Wirtschaftsinformatik
10. September 2024 @HAW Landshut

The telescope was an **invention**. But looking through it at Jupiter, knowing it had moons, was a discovery.

Large language models are much more like **discoveries**. We're constantly getting surprised by their capabilities.

Jeff Bezos [Fr23]



[We22]

LLMs are Universal Tools

Application:

Reorganizing Structured and Semi-Structured Texts

LLM as a Writing Assistant –
not for creativity,
but as a Super-Formatter



Structure tags describe
the meaning of text
parts

RQ

Quickly Restructure and Transform Text with Simple Prompts
Directly in the Chat Interface —How Effective Is It?

```

\begin{tabular}{llll}
Index & Topic & Course & Literature \\
\hline
0 & Python 101 & Introductory Course & \cite{smithPython101Introduction2023a, smithPython101Advanced2023} \\
1 & Java Fundamentals & Object-oriented Programming & \cite{jonesJavaFundamentalsBeginners2023}, \\
\href{https://github.com/example/JavaFundamentals}{Code} \\
2 & Java Fundamentals & GUI Development & \cite{jonesJavaFundamentalsGUI2023}, \\
\href{https://github.com/example/JavaFundamentals}{Code} \\
3 & DataScienceBasics & Data Analysis & \cite{brownDataScienceBasics2023}, \\
4 & Data Science Basics & Machine Learning Models & \cite{brownDataScienceBasics2023}, \\
5 & Data Science Basics & Data Visualization & \cite{brownDataScienceBasics2023}, \\
6 & Cyber Security Fundamentals & Network Security Fundamentals & \cite{thompsonCyberSecurityPro2024, williamsCyberSecurityPro2023} \\
7 & Cyber Security Fundamentals & Ethical Hacking & \cite{thompsonCyberSecurityPro2024, williamsCyberSecurityPro2023} \\
8 & Web Development 101 & Frontend Development & \cite{williamsWebDevelopment1012023}, \\
9 & Mobile App Development & App Development Basics & \cite{williamsMobileAppDevelopment2023}, \\
a,b & Mobile App Development & Backend Integration & \cite{williamsMobileAppDevelopment2023} \\
\hline
A & Machine Learning Mastery & Neural Networks & [13] \\
B & Machine Learning Mastery & Reinforcement Learning & [13] \\
C & Cloud Computing Essentials & Cloud Infrastructure & [5] \\
D & Database Management Systems & Database Design & [1] \\
E & Database Management Systems & Query Optimization & [1] \\
F & Game Development Basics & Graphics Programming & [6] \\
G & Cyber Security Professional & Incident Response & [10, 11] \\
H & Cyber Security Professional & Penetration Testing & [10, 11] \\
I & Cyber Security Professional & Threat Intelligence & [10, 11] \\
J & Cyber Security Professional & Cryptography & [10, 11] \\
\hline
\end{tabular}

```

Index	Topic	Course	Literature
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I	Cyber Security Professional	Threat Intelligence	[10, 11]
J	Cyber Security Professional	Cryptography	[10, 11]

Method

Experiment 1: LaTeX

Reorganize a LaTeX table

LaTeX → LaTeX

Experiment 2: Biblio

Transform Bibliographic Data

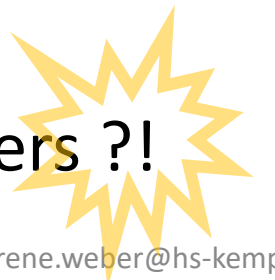
RIS → Opus XML

LLM: ChatGPT on April 29, to May 1, 2024 (gpt-3.5)


Qualitative Research design
Few cases & detailed analyses




LLMs are Pattern Matchers ?!



No	Prompt	Result
1	I will give you a LaTeX table. Please delete the first column. '''	Fig. 2
2a	I will give you a LaTeX table. Please swap the two last columns. '''	
2b	I will give you a LaTeX table. Please swap the "Course" and "Literature" columns'''	Fig. 3
3a	I will give you a LaTeX table. I want you to reduce the number of lines as follows. Some lines only differ in the last column. Please collapse these lines in one line. Collect their last column data.	Fig. 4
3b	identical to 3a	



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4a	I will give you a LaTeX table. Please format the e	

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Topic	Literature	Course
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Database Management Systems	[1]	Database Design
Database Management Systems	[1]	Query Optimization
Game Development Basics	[6]	Graphics Programming
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Java Fundamentals	[4], Code	GUI Development
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Data Science Basics	[2]	Machine Learning Models
Data Science Basics	[2]	Data Visualization
Cyber Security Fundamentals	[12]	Network Security Fund
Cyber Security Fundamentals	[12]	Ethical Hacking
Web Development 101	[3]	Frontend Development
Mobile App Development	[9]	App Development Basic
Mobile App Development	[9]	Backend Integration
Machine Learning Mastery	[13]	Neural Networks
Machine Learning Mastery	[13]	Reinforcement Learning
Cloud Computing Essentials	[5]	Cloud Infrastructure
Database Management Systems	[1]	Database Design
Database Management Systems	[1]	Query Optimization
Game Development Basics	[6]	Graphics Programming
Cyber Security Professional	[10, 11]	Incident Response
Cyber Security Professional	[10, 11]	Penetration Testing
Cyber Security Professional	[10, 11]	Threat Intelligence
Cyber Security Professional	[10, 11]	Cryptography

entries in the "Course" containing commas as it is. '''

entries in the "Courses" in one cell, separated by as it is. '''

Topic	Literature	Course
Python 101	[8, 7]	Introductory Course
Java Fundamentals	[4], Code	Object-oriented Programming, GUI Development
Data Science Basics	[2]	Data Analysis, Machine Learning Models, Data Visualization
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Cyber Security Professional	[10, 11]	Incident Response, Penetration Testing, Threat Intelligence, Cryptography

- 4a I will give you a LaTeX table. Please format the entries in the "Course" column in *Italics*. Keep the formatting of separating commas as it is. '''
- 4b I will give you a LaTeX table. Please format the entries in the "Courses" column in *Italics*. There may be multiple entries in one cell, separated by commas. Keep the formatting of separating commas as it is. '''
- 4c I will give you a LaTeX table. Please format the entries in the "Courses" column in *Italics*. There may be multiple entries in one cell, separated by commas. Spare the commas out. '''
- 4d I will give you a LaTeX table. Please format the entries in the "Courses" column in *Italics* excluding the commas. '''

Result

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Topic	Literature	Courses
Python 101	[8, 7]	<i>Introductory Course</i>
Java Fundamentals	[4], Code	<i>Object-oriented Programming, GUI Development</i>
Data Science Basics	[2]	<i>Data Analysis, Machine Learning Models, Data Visualization</i>
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Game Development Basics	[6]	<i>Graphics Programming</i>
Cyber Security Professional	[10, 11]	<i>Incident Response, Penetration Testing, Threat Intelligence, Cryptography</i>

Experiment 1 LaTeX – Result

Always Produces Correct LaTeX

Understands LaTeX Structure Very Well

? Column Titles Are Better Than Column Numbers

? Commas as Structure Indicators Are Problematic

Experiment 2 Biblio

Convert between two formats

Real-world data


Less well-known formats (than LaTeX)

RIS → OPUS XML

[Zurück zur Trefferliste](#)

Treffer 1 von 1


EtherCAT Gateway für eine Arduino basierte LuftqualitätsMessung zur Visualisierung an eine Beckhoff SPS

 Stefan Seehuber, Peter Crämer, Stefan Kipfelsberger, Martin Versen

Abstract

DE Die Luftqualität in Innenräumen ist besonders ausschlaggebend für die Konzentrations- und Leistungsfähigkeit [1] – und in Zeiten von Corona auch für den Infektionsschutz. Die Qualität der Luft kann u.a. aus dem CO₂-Gehalt, der Temperatur, der Luftfeuchte und verschiedenen Feinstaubwerten abgeleitet werden [2]. Die Entwicklung eines Messsystems zur automatischen Messung der Luftqualität und der Übertragung der Messdaten an eine Software-SPS wird auf Basis einer Bachelor-Arbeit [3] vorgestellt. Dies beinhaltet die Softwareentwicklung in diversen Systemkomponenten und die Inbetriebnahme eines funktionsfähigen Prototyps.

Volltext Dateien herunterladen

 [3ESI2022_Tagungsband_Seehuber.pdf](#) (1170KB)



Metadaten exportieren

[BibTeX](#)[RIS](#)[XML](#)

Data

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A1 - Seehuber, Stefan
A1 - Crämer, Peter
A1 - Kipfelsberger, Stefan
A1 - Versen, Martin
A2 - Artem, Ivanov
A2 - Marc, Bicker
A2 - Peter, Patzelt

T1 - EtherCAT Gateway für eine Arduino basierte LuftqualitätsMessung zur Visualisierung an Beckhoff SPS

T2 - Tagungsband 3. Symposium Elektronik und Systemintegration ESI

N2 - Die Luftqualität in Innenräumen ist besonders ausschlaggebend für die Konzentrations-Leistungsfähigkeit [1] – und in Zeiten von Corona auch für den Infektionsschutz. Die Qualität der Luft kann u.a. aus dem CO2-Gehalt, der Temperatur, der Luftfeuchte und verschiedenen Feinstaubwerten abgeleitet werden [2]. Die Entwicklung eines Messsystems zur automatischen Messung der Luftqualität und der Übertragung der Messdaten an eine Software-SPS wird auf Basis einer Bachelor-Arbeit vorgestellt. Dies beinhaltet die Softwareentwicklung in diversen Systemkomponenten und die Inbetriebnahme eines funktionsfähigen Prototyps.

Y1 - 2022

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SP - 98

EP - 106

ER -

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    <author>Peter Crämer</author>
    <author>Stefan Kipfelsberger</author>
    <author>Martin Versen</author>
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9/2024, Irene Weber, irene.weber@hs-kempten.de

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<author>Peter Crämer</author>
<author>Stefan Kipfelsberger</author>
<author>Martin Versen</author>
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<collection role="collections" number="">Tagungsband 3. Symposium E
  
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[MFM22]	MUENCH	HAWL	3. Symp ESI		16	35
[Zu21]	ZUGSCHWERT	HAWL	- na -		17	23
[SH24]	SELIGER	THR	CIPS 2024		18	36

connections. To ensure authenticity, TLS uses certificates that are exchanged at the beginning of each new connection. Due to expiration or early revocation of certificates, the deployment of new certificates to devices in the field is necessary. In addition, a device must identify revoked certificates during connection establishment to abort the connection. This paper presents the implementation of these two functionalities within a Security Gateway for the power grid. The nature of embedded systems with their limited resources and requirements regarding dependability impact the device-specific implementation. With these features, the existing Public-Key Infrastructure System.

Systemkomponenten und die Inbetriebnahme eines funktionsfähigen Prototyps.</abstract>
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 A1 - Kipfelsberger, Stefan
 A1 - Versen, Martin
 A2 - Artem, Ivanov
 A2 - Marc, Bicker
 A2 - Peter, Patzelt
 T1 - EtherCAT Gateway für eine Arduino basierte LuftqualitätsMessung zur Visualisierung an eine Beckhoff SPS
 T2 - Tagungsband 3. Symposium Elektronik und Systemintegration ESI
 N2 - Die Luftqualität in Innenräumen ist besonders ausschlaggebend für die Konzentrations- und Leistungsfähigkeit [1] – und in Zeiten von Corona auch für den Infektionsschutz. Die Qualität der Luft kann u.a. aus dem CO2-Gehalt, der Temperatur, der Luftfeuchte und verschiedenen Feinstaubwerten abgeleitet werden [2]. Die Entwicklung eines Messsystems zur automatischen Messung der Luftqualität und der Übertragung der Messdaten an eine Software-SPS wird auf Basis einer Bachelor-Arbeit [3] vorgestellt. Dies beinhaltet die Softwareentwicklung in diversen Systemkomponenten und die Inbetriebnahme eines funktionsfähigen Prototyps.
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Seehuber – one-shot example

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A2 - Artem, Ivanov
A2 - Marc, Bicker
A2 - Peter, Patzelt
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Seliger – a task

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KW - EMI
KW - Shielding tape
KW - High-Temperature Storage
KW - adhesive conductive EMI shield
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Seehuber – one-shot example

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Seehuber – one-shot example

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Values from SEEHUBER.RIS and SEEHUBER.XML

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A1	Crämer, Peter
A1	Kipfelsberger, Stefan
A1	Versen, Martin
T2	Tagungsband 3. Symposium Elektronik und Systemintegration ESI
UR	https://opus4.kobv.de/opus4-haw-landshut/frontdoor/index/index/docId/366
f	https://opus4.kobv.de/opus4-haw-landshut/files/366/3ESI2022_Tagungsband_Seehuber.pdf

RIS →

XML →

Values from MUENCH.RIS and generated by ChatGPT

Y1	2022
A1	Münch, Andreas
A1	Frauenschläger, Tobias
A1	Mottok, Jürgen
T2	Tagungsband 3. Symposium Elektronik und Systemintegration ESI
UR	https://opus4.kobv.de/opus4-haw-landshut/frontdoor/index/index/docId/365
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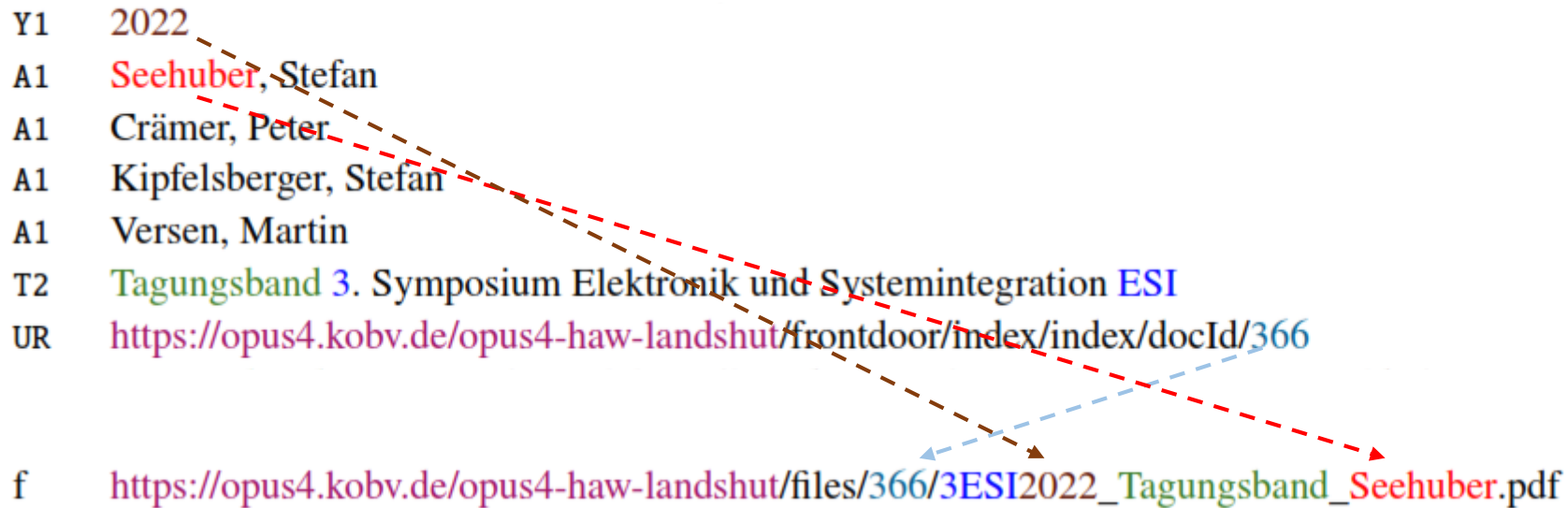
RIS →

→ XML

Values from SEEHUBER.RIS and SEEHUBER.XML

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A1 Versen, Martin
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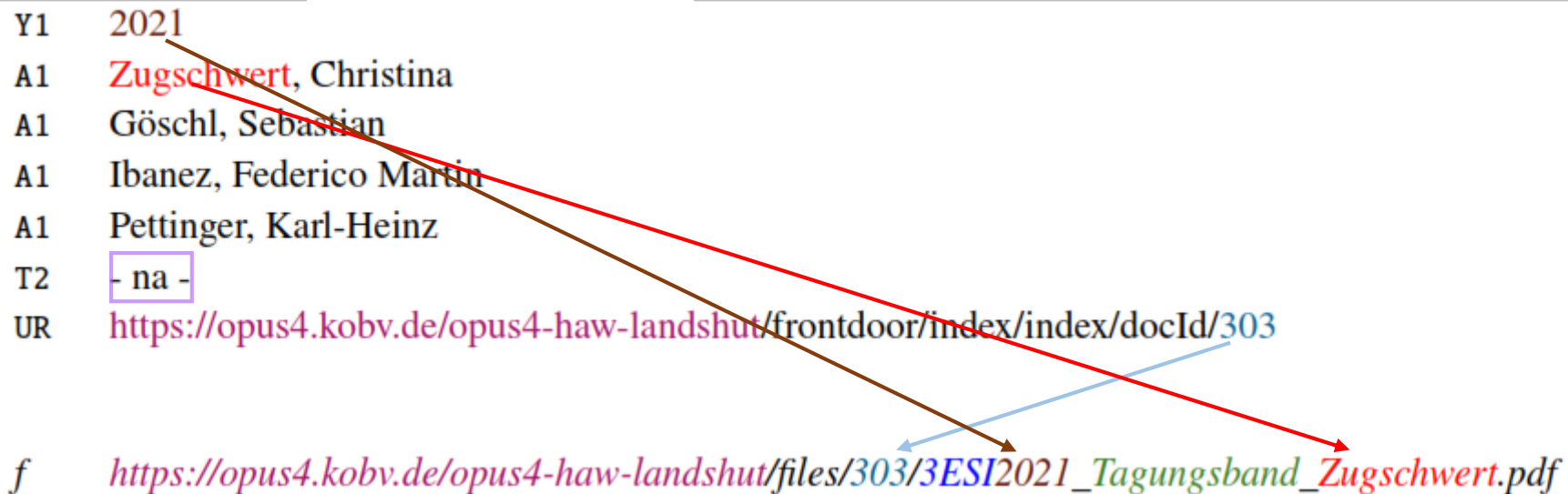
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Values from ZUGSCHWERT.RIS and generated by ChatGPT

Y1 2021
A1 Zugschwert, Christina
A1 Göschl, Sebastian
A1 Ibanez, Federico Martin
A1 Pettinger, Karl-Heinz
T2 - na -
UR <https://opus4.kobv.de/opus4-haw-landshut/frontdoor/index/index/docId/303>

f https://opus4.kobv.de/opus4-haw-landshut/files/303/3ESI2021_Tagungsband_Zugschwert.pdf



Values from SEEHUBER.RIS and SEEHUBER.XML

Y1	2022
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A1	Crämer, Peter
A1	Kipfelsberger, Stefan
A1	Versen, Martin
T2	Tagungsband 3. Symposium Elektronik und Systemintegration ESI
UR	https://opus4.kobv.de/opus4-haw-landshut/frontdoor/index/index/docId/366
f	https://opus4.kobv.de/opus4-haw-landshut/files/366/3ESI2022_Tagungsband_Seehuber.pdf

Values from SELIGER.RIS and generated by ChatGPT

Y1	2024
A1	Seliger, Norbert
A1	Helmbrecht, Cordula
T2	Proccedings CIPS 2024 - 13th International Conference on Integrated Power Electronics Systems
UR	https://opus4.kobv.de/opus4-rosenheim/frontdoor/index/index/docId/2386
f	https://opus4.kobv.de/opus4-rosenheim/files/2386/CIPS2024_Proceedings_Seliger.pdf

Seehuber – one-shot example

```

TY - CONF
A1 - Seehuber, Stefan
A1 - Crämer, Peter
A1 - Kipfelsberger, Stefan
A1 - Versen, Martin
A2 - Artem, Ivanov
A2 - Marc, Bicker
A2 - Peter, Patzelt
T1 - EtherCAT Gateway für e
Beckhoff SPS
T2 - Tagungsband 3. Symposi
N2 - Die Luftqualität in In
Leistungsfähigkeit [1] - und
Luft kann u.a. aus dem CO2-G
abgeleitet werden [2]. Die E
und der Übertragung der Mess
vorgestellt. Dies beinhaltet
Inbetriebnahme eines funktio
Y1 - 2022
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UR - https://nbn-resolving.
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SP - 98
EP - 106
ER -

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<collection role="collections" number="">Ta
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Seliger – a task

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A1 - Helmbrecht, Cordula
T1 - A high-frequency
during High-Temperature
T2 - Proceedings CIPS
N2 - The variation of
temperature storage (HT
as signal return paths
deterioration are analy
contact impedance degra
Contact resistance and
a declined magnetic fie
KW - EMI
KW - Shielding tape
KW - High-Temperature
KW - adhesive conducti
Y1 - 2024
UR - https://opus4.kob
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CY - Düsseldorf
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Experiment 2 Biblio – Result

Correct Conversion from RIS to XML:

- Author Names
- Number of Authors

Correctly Utilized Trained Knowledge:

- Language

No Hallucinations, as is correct:

- Did Not Invent New XML Tags for Keywords

Constructed Values ➡ LLM ist is a „Pattern Matcher“

Contributions

- Explored a novel research question: transforming (semi-)structured texts
- Employed a qualitative research design which is rarely used in the field
- Demonstrated that this LLM handles structural information very well RQ
- Proposed a practically useful application area
- Provided a new perspective on “hallucinations”
- Identified approaches for further research
 - „Pattern Matching“: how do hallucinations occur?
 - prompt design: is explicit structure helpful? [Bu24]

Related Worts

Ref	Purpose	Input	Output
[Wu20]	Identify co-reference	NL	SEM (XML)
[Wu20]	Resolve co-reference	SEM (XML)	STRUC
[Ar23]	Extract data	SEM (HTML, TXT, XML)	STRUC (DB)
[PM24]	Extract data	NL (scientific articles)	STRUC (DB)
[Mi23]	NLP tasks	NL	Diverse (SEM, NL, etc.)
[Ye24]	Perform graph tasks	SEM (graph)	NL (e.g., a category)
[Ch24]	Create training data	STRUC (graph)	STRUC (training data)
[Ji23b]	Answer questions	STRUC (Diverse)	NL or STRUC (queries)
[FFK23]	Draw diagrams	NL	STRUC (JSON diagrams)
[He23]	Create math exercises	NL	STRUC (LaTeX math)
[He23]	Phrase math formulae	STRUC (LaTeX math)	NL
[He23]	Create drawings	NL	STRUC (TikZ code)
[Xi24]	Create documents	NL + STRUC (an example)	STRUC (like the example)
[La23]	Edit (not create) texts	NL	NL
exp1	Edit (not create) docs	SEM (LaTeX)	SEM (LaTeX)
exp2	Edit (not create) docs	STRUC (RIS)	STRUC (OPUS XML)
[Si23]	Transform tables	STRUC (Diverse)	STRUC (Diverse, e.g., csv, json)
[Bo24]	Find column types	STRUC (Table)	STRUC (json list)

References

- [Ar23] Arora, S., Yang, B., Eyuboglu, S., Narayan, A., Hojel, A., Trummer, I., & Ré, C. (2023). *Language Models Enable Simple Systems for Generating Structured Views of Heterogeneous Data Lakes*. <https://doi.org/10.48550/arXiv.2304.09433>
- [Bo24] Bodensohn, J.-M., Brackmann, U., Vogel, L., Urban, M., Sanghi, A., & Binnig, C. (2024). LLMs for data engineering on enterprise data. *Proceedings of the VLDB Endowment*. ISSN, 2150, 8097.
- [Bu24] Ye, R., Zhang, C., Wang, R., Xu, S., & Zhang, Y. (2024). *Language is All a Graph Needs*. <https://doi.org/10.48550/arXiv.2308.07134>
Buchmann, J., Eichler, M., Bodensohn, J.-M., Kuznetsov, I., & Gurevych, I. (2024). Document structure in long document transformers. In Y. Graham & M. Purver (Hrsg.), *Proceedings of the 18th conference of the european chapter of the association for computational linguistics (volume 1: Long papers)* (S. 1056–1073). Association for Computational Linguistics. <https://aclanthology.org/2024.eacl-long.64>
- [Ch24] Chen, Z., Mao, H., Wen, H., Han, H., Jin, W., Zhang, H., Liu, H., & Tang, J. (2024). *Label-free Node Classification on Graphs with Large Language Models (LLMs)*. <https://doi.org/10.48550/arXiv.2310.04668>
- [FFK23] Fill, H.-G., Fettke, P., & Köpke, J. (2023). Conceptual Modeling and Large Language Models: Impressions From First Experiments With ChatGPT. *Enterprise Modelling and Information Systems Architectures (EMISAJ)*, 18, 1–15. <https://doi.org/10.18417/emisa.18.3>
- [Fr24] Fridman, L. (2023, Dezember 14). *Transcript for Jeff Bezos: Amazon and Blue Origin | Lex Fridman Podcast #405*. Lex Fridman. <https://lexfridman.com/jeff-bezos-transcript/>
- [He23] Helfrich-Schkarbanenko, A. (2023). *Mathematik und ChatGPT: Ein Rendezvous am Fuße der technologischen Singularität*. Springer Berlin Heidelberg. <https://doi.org/10.1007/978-3-662-68209-8>
- [J23b] Jiang, J., Zhou, K., Dong, Z., Ye, K., Zhao, W. X., & Wen, J.-R. (2023). *StructGPT: A General Framework for Large Language Model to Reason over Structured Data*. <https://doi.org/10.48550/arXiv.2305.09645>
- [La23] Laban, P., Vig, J., Hearst, M. A., Xiong, C., & Wu, C.-S. (2023). *Beyond the Chat: Executable and Verifiable Text-Editing with LLMs*. [https://doi.org/DOI: 10.48550/arXiv.2309.15337](https://doi.org/DOI:10.48550/arXiv.2309.15337)
- [Mi23] Min, B., Ross, H., Sulem, E., Veyseh, A. P. B., Nguyen, T. H., Sainz, O., Agirre, E., Heintz, I., & Roth, D. (2023). Recent Advances in Natural Language Processing via Large Pre-trained Language Models: A Survey. *ACM Computing Surveys*, 56(2), 30:1-30:40. <https://doi.org/10.1145/3605943>
- [PM24] Polak, M. P., & Morgan, D. (2024). Extracting accurate materials data from research papers with conversational language models and prompt engineering. *Nature Communications*, 15(1), 1569. <https://doi.org/10.1038/s41467-024-45914-8>
- [Si23] Singha, A., Cambronero, J., Gulwani, S., Le, V., & Parnin, C. (2023). *Tabular Representation, Noisy Operators, and Impacts on Table Structure Understanding Tasks in LLMs*. <http://arxiv.org/abs/2310.10358>
- [We22] Wei, J., Tay, Y., Bommasani, R., Raffel, C., Zoph, B., Borgeaud, S., Yogatama, D., Bosma, M., Zhou, D., Metzler, D., Chi, E. H., Hashimoto, T., Vinyals, O., Liang, P., Dean, J., & Fedus, W. (2022). *Emergent Abilities of Large Language Models*. <https://doi.org/10.48550/arXiv.2206.07682>

References

- [Wu20] Wu, W., Wang, F., Yuan, A., Wu, F., & Li, J. (2020). CorefQA: Coreference Resolution as Query-based Span Prediction. In D. Jurafsky, J. Chai, N. Schluter, & J. Tetreault (Hrsg.), *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics* (S. 6953–6963). Association for Computational Linguistics.
<https://doi.org/10.18653/v1/2020.acl-main.622>
- [Xi24] Xia, C., Xing, C., Du, J., Yang, X., Feng, Y., Xu, R., Yin, W., & Xiong, C. (2024). *FOFO: A Benchmark to Evaluate LLMs' Format-Following Capability*.
<https://doi.org/10.48550/arXiv.2402.18667>
- [MFM22] Münch, A., Frauenschläger, T., & Mottok, J. (2022). Integration of a Security Gateway for Critical Infrastructure into Existing PKI Systems. 88–97. <https://doi.org/10.57688/365>
- [Se22] Seehuber, S., Crämer, P., Kipfelsberger, S., & Versen, M. (2022). EtherCAT Gateway für eine Arduino basierte LuftqualitätsMessung zur Visualisierung an eine Beckhoff SPS. 98–106.
<https://doi.org/10.57688/366>
- [Zu21] Seliger, N., & Helmbrecht, C. (2024). A high-frequency performance and degradation study of adhesive conductive EMI shielding tapes during High-Temperature Storage. 297–303.
<https://opus4.kobv.de/opus4-rosenheim/frontdoor/index/index/docId/2386>
- [SH24] Zugschwert, C., Göschl, S., Ibanez, F. M., & Pettinger, K.-H. (2021). Development of a multi-timescale method for classifying hybrid energy storage systems in grid applications. 1–7.
<https://doi.org/10.57688/303>

Prompts und Daten: https://github.com/weberi/2024_AKWI_structured_gpt_experiments

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<https://doi.org/10.18420/AKWI2024-001>