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Preliminary results of the acceptance analysis based on app store reviews by the example of the Corona-Warn-App

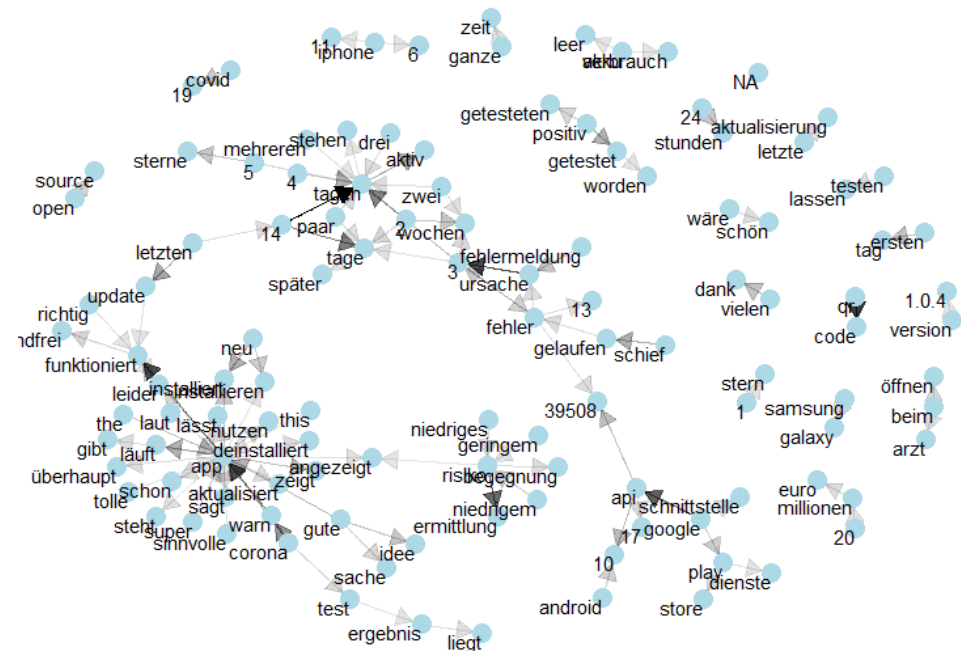
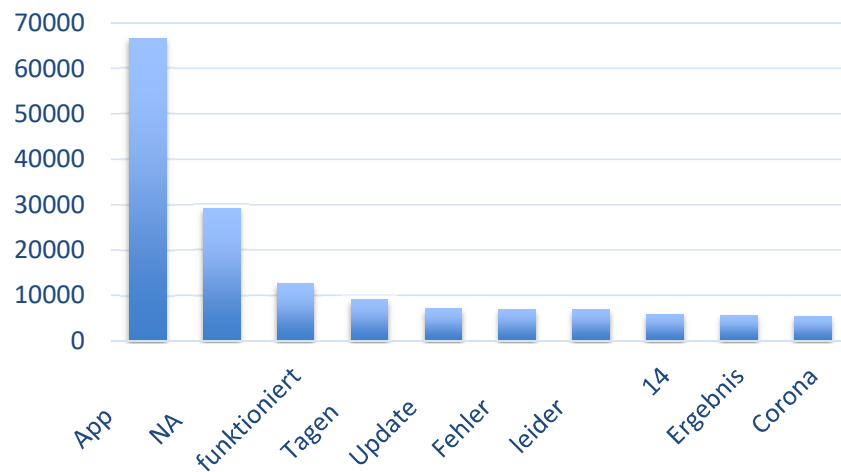
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Explorative Analyses

- 78,963 reviews from users of the Corona-Warn-App (Google Play Store and iOS App Store)
- Explorative Analyses of word frequencies and bigrams

Most common words
Corona-Warn-App



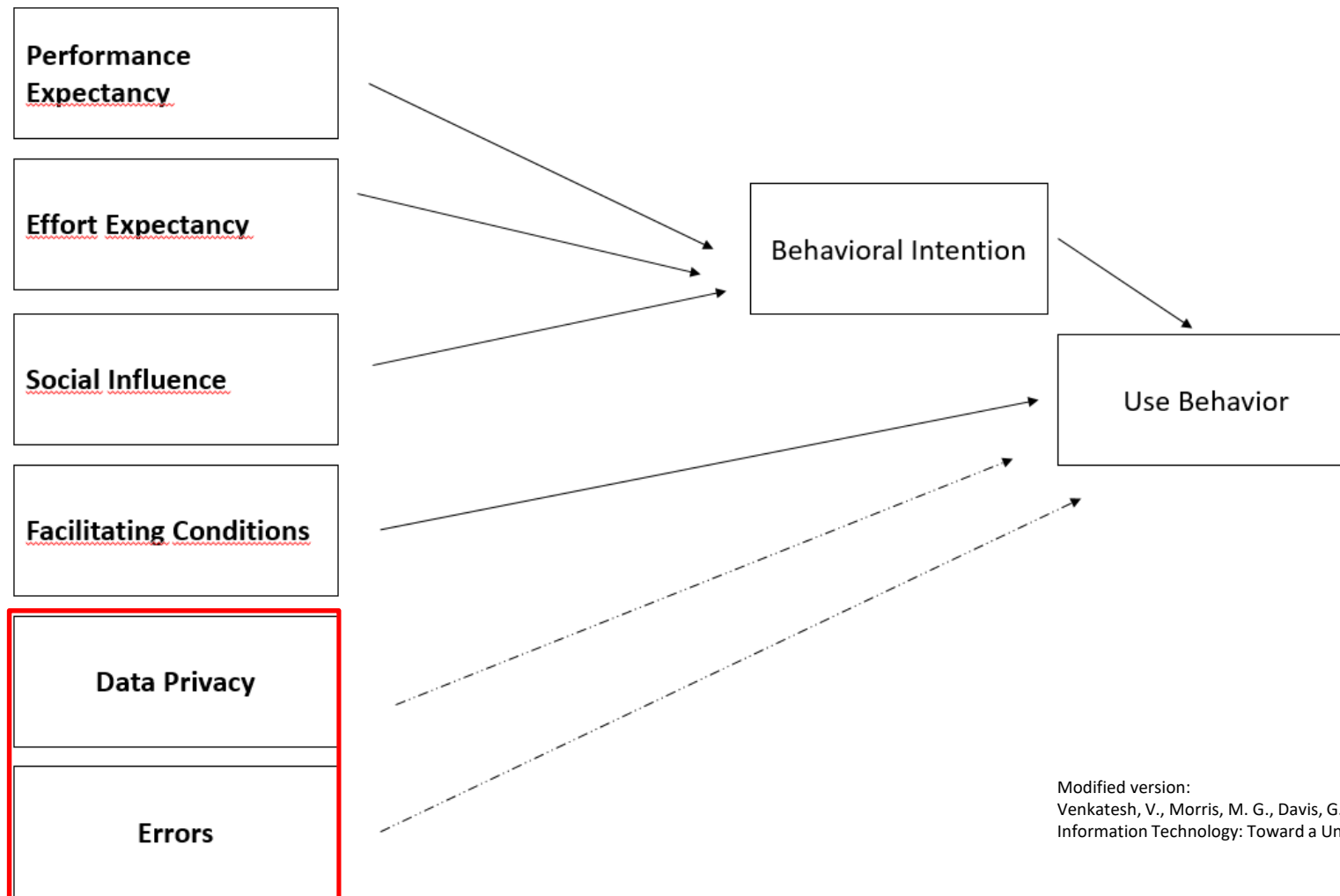
- The data only shows words and topics that are common in reviews, but there is no theoretical basis for linking these words and topics to user acceptance
- Explorative analyses are only partially informative regarding user acceptance

Theory-driven Analyses

- Idea: Using an established technology acceptance model to identify relevant factors of user acceptance → UTAUT Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2006)
- Based on additional literature review, we extended the model by including the components *Data Privacy* and *Errors*
- We next operationalized the model components using a selection of keywords based on scientific consensus
- Aim: Identification of the most important model components in the reviews
- The component *Social Influence* was excluded due to the fact that the data basis doesn't include the relevant information

Venkatesh, V., Morris, M. G., Davis, G. B., Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*. 27 (3). 425-478.

Acceptance Model + Extension



Modified version:
Venkatesh, V., Morris, M. G., Davis, G. B., Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*. 27 (3). 425-478.

UTAUT Components + Extensions	Definition	Keywords Corona-Warn-App
Performance Expectancy	How does the user benefit from the app/what function should the app fulfill?	Testergebnis, Test, Ergebnis, Risikobegegnung, Risiko, Begegnung, Warnung
Effort Expectancy	Users' perception of the ease of use	Übersichtlich, leichte Bedienung, einfache Bedienung, leichte Nutzung, einfache Nutzung, schnelles Auffinden/Finden, leichtes Auffinden/Finden
Social Influence	Extent to which users perceive that significant others (e.g., family and friends) believe they should use a particular technology.	
Facilitating Conditions	users' perceptions of resources and support available for using the app	FAQ, Beantwortung, Antwort, Hotline, Support, Einführung (Video, EinmalJourney), Erklärung, Information, (ggf. hilfreich als Kombinationswort)
Data Privacy	Data privacy, anonymity	Datenschutz, Daten, anonym, Anonymität, Privatsphäre, Datensicherheit, Sicherheit, sicher, Vertrauen
Errors	Malfunctions, errors, technical problems	Kein Testergebnis, kein Ergebnis, keine Risikobegegnung, keine Begegnung, keine Warnung, funktioniert nicht, Fehler, Installation Problem

UTAUT Components + Extensions	Keywords Corona-Warn-App	Frequencies	Relative Frequencies
Performance Expectancy	Testergebnis	2671 (=2465)	12,5%
	Test	4615	23,4%
	Ergebnis	5621 (=4629)	23,5%
	Risikobegegnung	712 (=602)	3,1%
	Risiko	5336	27,1%
	Begegnung	1516 (=1455)	7,4%
	Warnung	808 (=618)	3,1%
Effort Expectancy	Übersichtlich	1033	88,2%
	leichte Bedienung	13	1,1%
	einfache Bedienung	119	10,2%
	leichte Nutzung	0	
	einfache Nutzung	4	0,3%
	schnell finden	1	0,1%
	leicht finden	1	0,1%
	schnell auffinden	0	
	leicht auffinden	0	

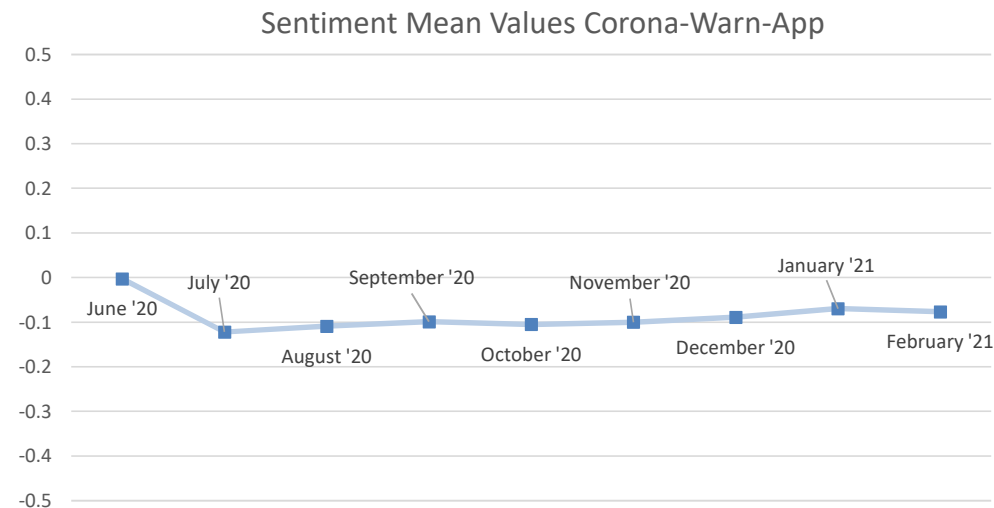
→ Based on the frequency of the keywords, the user reviews highlight the relevance of the components performance expectation, data protection, and errors

UTAUT Components + Extensions	Keywords Corona-Warn-App	Frequencies	Relative Frequencies
Facilitating Conditions	FAQ	244	10,5%
	Beantwortung	6	0,3%
	Antwort	591	25,5%
	Hotline	451	19,5%
	Support	342	14,8%
	Einführung	66	2,9%
	Erklärung	177	7,7%
	Information	438	18,9%
Data Privacy	Datenschutz	2649	29,6%
	Daten	3513	39,3%
	Anonym	248	2,8%
	Anonymität	49	0,6%
	Privatsphäre	85	1,0%
	Datensicherheit	73	0,8%
	Sicherheit	564	6,3%
	Sicher	1157	12,9%
	Vertrauen	589	6,6%
	Daten sicher	12	0,1%
	Errors	Kein Testergebnis	206
kein Ergebnis		922	6,6%
keine Risikobegegnung		110	0,8%
keine Begegnung		61	0,4%
keine Warnung		190	1,4%
funktioniert nicht		1451	10,5%
Fehler		6975	50,3%
Installation		1956	14,1%
Problem		2010	14,5%

Sentiment Analysis

- Aim of a sentiment analysis: To quantify affective valence (=positivity/negativity) of a text, using a lexicon-based approach to evaluate the data (sentiWS;-Remus, Quasthoff & Heyer, 2010)
- Is the prevailing sentiment toward the Corona-Warn-App in reviews more positive or negative?

- Range valence (-1, +1)
- Overall mean = -0.0975



- Sentiment in the reviews appears to be relatively consistent from June '20 to February '21
- Overall, the sentiment of the reviews is neither particularly positive nor particularly negative towards the Corona-Warn-App

Conclusions

Acceptance Model

Focus on optimizing the components performance expectation, data protection and error can help increase pandemic app acceptance

Limitations:

- The keywords are considered independently of the context and content of the specific review
- Keyword frequencies do not provide a "metric" for public acceptance of the Corona-Warn-App, but highlight relevant areas of concern

Sentiment Analysis

The valence toward the Corona Warn-App was rather constant and neutral, without signs of pandemic-related changes

Limitations:

- Reviews comprise mainly very satisfied or very dissatisfied users and therefore ratings seem to balance each other out
- Reviews only reflect the mood of actual app users and do not allow to draw conclusions about to the general population

Contact Details

For questions or comments please contact

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Sources

Remus, R., Quasthoff, U. & Heyer, G. (2010). SentiWS - a Publicly Available German-language Resource for Sentiment Analysis. *Proceedings of the 7th International Language Resources and Evaluation (LREC'10)*. 1168-1171.

Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*. 27 (3). 425-478.