INSTITUTE OF VISUAL COMPUTING

TU Graz
SCIENCE
PASSION
TECHNOLOGY

IUI 2025
A User-Centric Adaption Model for Document Visualizations with Different Levels of Detail within a Consumer Health Information System

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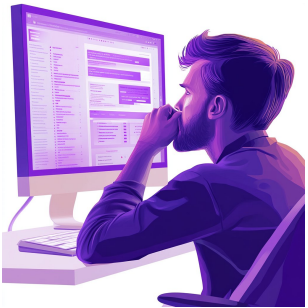
ACHIS

The Challenge in Health Information Access

Dense medical texts



Varied digital health literacy

Overwhelming amount of content

Visual Literacy

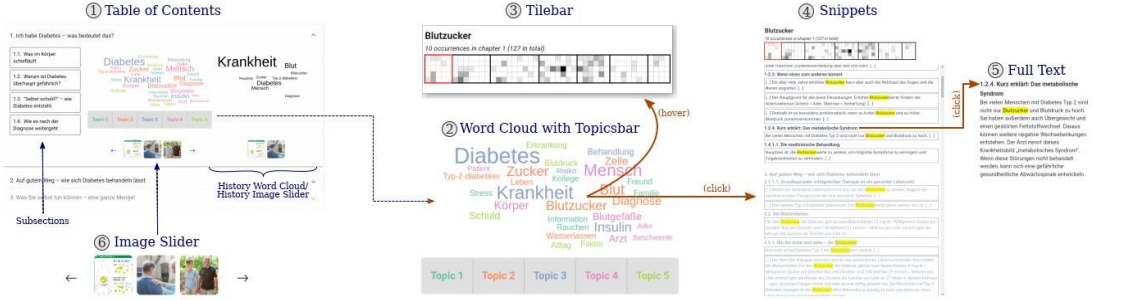
"A group of vision competencies a human being can develop by seeing and at the same time having and integrating other sensory experiences" [1]

"Ability to properly process information from data graphics" [2]

- Motivation: Consider visual literacy for view-components and visualizations

1. R. Lengler, "Identifying the Competencies of 'Visual Literacy' - a Prerequisite for Knowledge Visualization," Tenth International Conference on Information Visualisation (IV'06), London, UK, 2006, pp. 232-236, doi: 10.1109/IV.2006.60.
2. A. Locoro, W. P. Fisher and L. Mari, "Visual Information Literacy: Definition, Construct Modeling and Assessment," in IEEE Access, vol. 9, pp. 71053-71071, 2021, doi: 10.1109/ACCESS.2021.3078429.

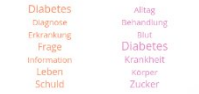
Adaptive Consumer Health Information System ($A^{+}CHIS$)

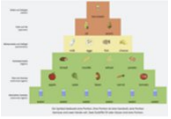


L. Shao, S. Lengauer, H. Miri, M. Bedek, B. Kubicek, C. Kupfer, M. Zangl, B. Dienstbier,K. Jeitler, C. Krenn, C. Loder, T. Semlitsch, C. Zipp, D. Albert, A. Siebenhofer, T. Schreck: Visual Document Exploration with Adaptive Level of Detail – Design, Implementation and Evaluation in the Health Information Domain. International Conference on Information Visualization Theory and Applications, 2023.

A+CHIS - Outline Foundation

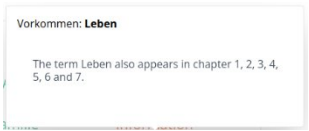
- Wordcloud
- Topiccloud
- Tilebar
- Text-Snippets
- Image Slider
- Infographic-based visualizations





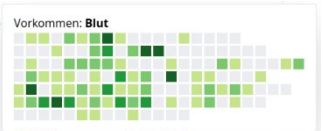
Concept - Levels of Detail (LoD)

Simple

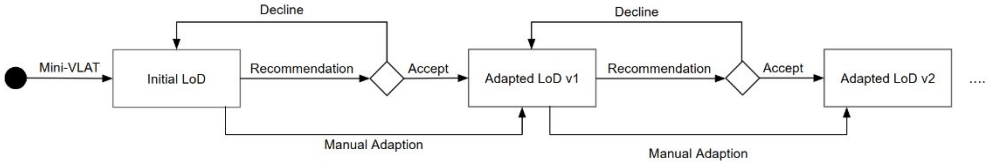


Basic

Advanced



Adapting the LoD



Three types of adaptation:

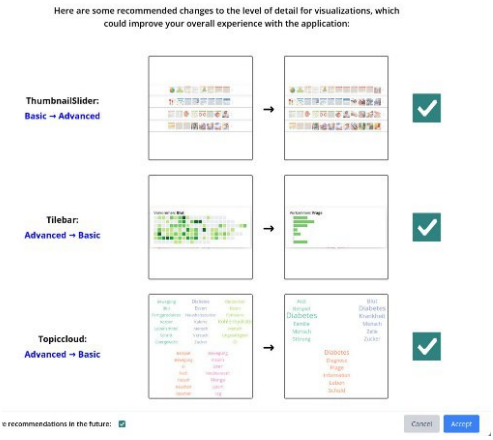
- Based on visual literacy estimation (initial test)
- User-controlled manual adjustment
- System-driven real-time adaptation

Manual Adaptation

- Matrix Approach:
  - Columns: LoDs,
  - Rows: Visualizations
- Provides an overview of all LoDs
- Users can select LoD directly on the matrix
- Column-wide selection

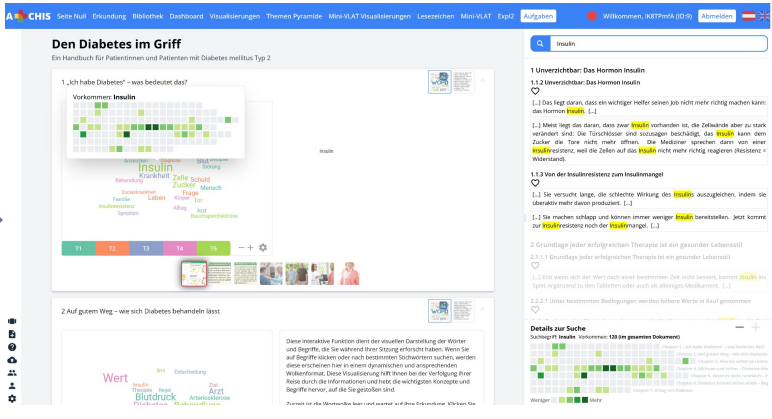
Automatic Adaptation - Recommendation Approach

- Rule-based system
- Basis: Dwelling times:
  - Hypothesis: Longer dwelling time = higher satisfaction
  - User evaluates new LoD recommendations

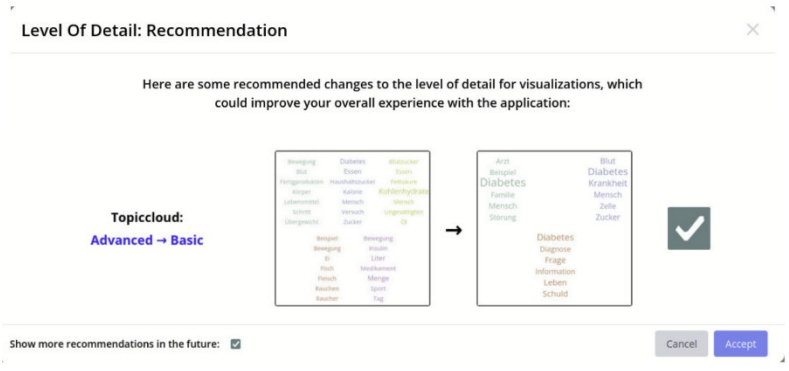


Use Case


AOK
Die Gesundheitskasse.
Den Diabetes im Griff
Ein Handbuch für Patientinnen und Patienten mit Diabetes mellitus Typ 2
Curaplan

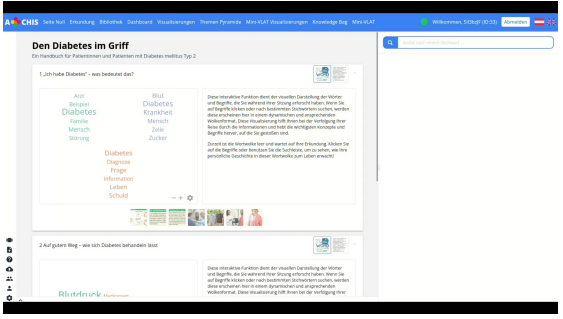

CHIS
Seite Null
Erkundung
Bibliothek
Dashboard
Visualisierungen
Themen Pyramide
Mini-VLAT Visualisierungen
Lesezeichen
Mini-VLAT
Expl2
Aufgaben
Willkommen, IKBTPmrA (ID:9)
Abmelden
Den Diabetes im Griff
Ein Handbuch für Patientinnen und Patienten mit Diabetes mellitus Typ 2
1 „Ich habe Diabetes" – was bedeutet das?
Vorkommen: Insulin
Insulin
Krankheit
Zelle
Schuld
Zucker
Mensch
Frage
Tor
Leben
Körper
Alltag
Arzt
T1
T2
T3
T4
T5
2 Auf gutem Weg – wie sich Diabetes behandeln lässt
Wert
Blutdruck
Arzt
Arteriosklerose
Insulin
Suchbegriff: Insulin
Vorkommen: 120 (im gesamten Dokument)
Details zur Suche

Use Case

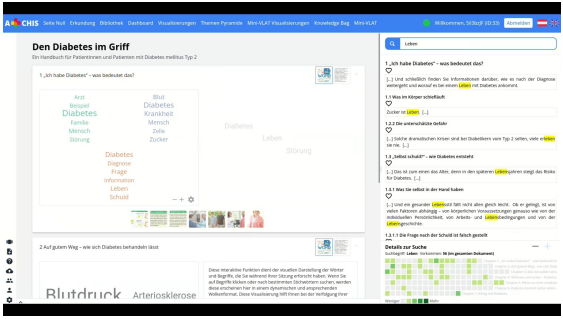

Level Of Detail: Recommendation
Here are some recommended changes to the level of detail for visualizations, which could improve your overall experience with the application:
Topiccloud:
Advanced → Basic
Arzt
Beispiel
Diabetes
Familie
Mensch
Störung
Blut
Diabetes
Krankheit
Mensch
Zelle
Zucker
Diabetes
Diagnose
Frage
Information
Leben
Schuld
Show more recommendations in the future:
Cancel
Accept

Demo

Manual



Automatic



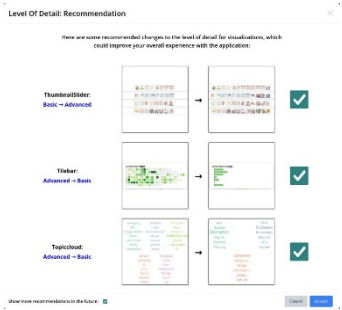
Future Work

- Evaluation & Validation - user studies:
  - Assess adaptation effectiveness
  - Measure user satisfaction
  - Compare manual vs. system-driven LoD selection
- More refined adaptation heuristics
- Expansion to other visualizations

Conclusion

- **A+CHIS**
- Users have different levels of visual literacy
- Adaptation of complexity of view-components
- User can decide on LoD manually and automatically
- Matrix approach for manual LoD adaptation
- Recommendation approach for automatic LoD adaptation

Thank You!



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