

# Vyhledávání informací

Perspektivy vyhledávání informací

15. 12. 2023

# Rozehrivací vyhledávačka



Co bude ovlivňovat způsoby  
jakými vyhledáváme?

Jaké trendy a problémy  
nás čekají?



lookup *vs* exploratory search

# Exploratorní vyhledávání

„Although there exists an ample amount of research into understanding exploration, most of the major information retrieval (IR) systems do not provide tailored and adaptive support for such tasks. One reason is the lack of empirical knowledge on how to distinguish exploratory and lookup search behaviors in IR systems.“

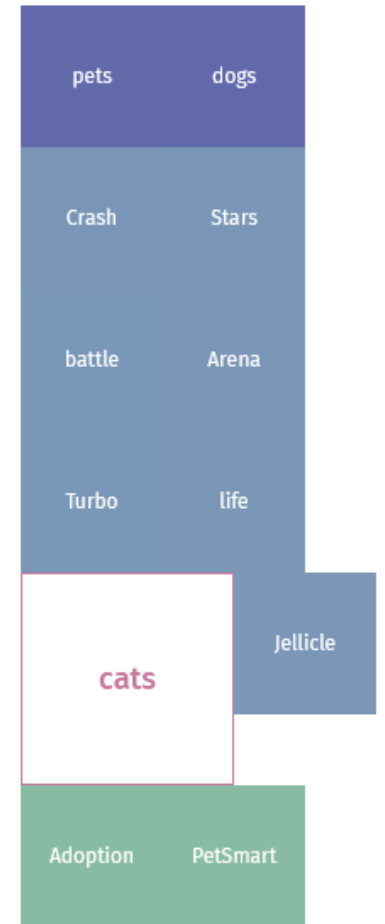
<https://doi.org/10.1002/asi.23617>

# Exploratorní vyhledávání

- *exploratory search*
- modely vyhledávání v doménách, o kterých uživatel nic neví
- klíčové slovo je fajn
- co když nevíme, jaké použít?
- co když neznáme ani otázku?
- doporučení, propojení výsledků, vizualizace...

# Experimentální přístup (nejen v GUI)

- <https://millionshort.com/>
- <https://swisscows.ch/> (semantic map)
- <https://search.muz.li/>
- Frankenplace *[ukončeno]*



<https://mediasuite.clariah.nl/>

Nissan GTR price

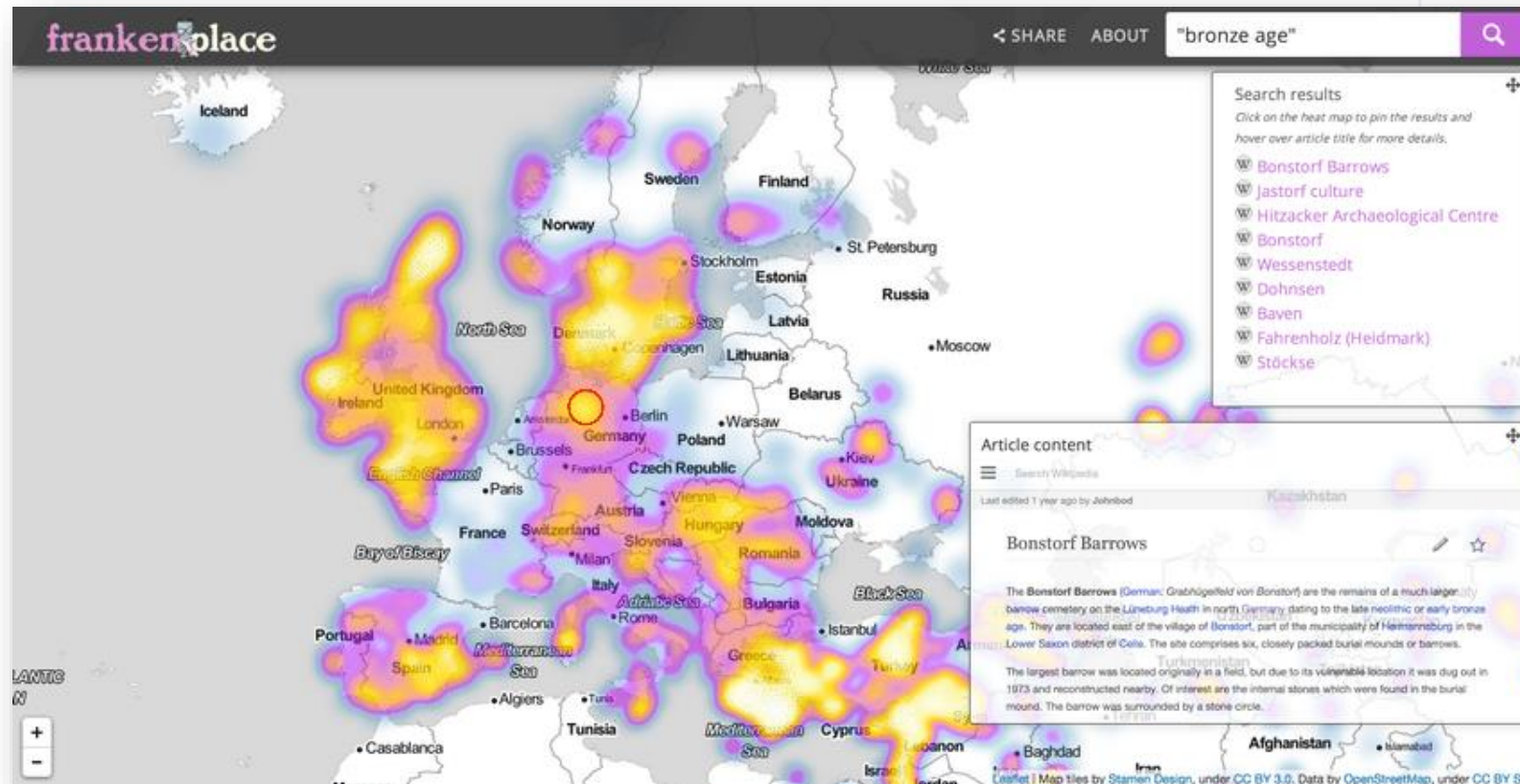
People also ask

How much does it cost to lease a Nissan GT-R? ▾

What are the pros and cons of Nissan GT-R? ▾

Is Nissan GT-R the ultimate streetcar? ▾

How much does 2020 Nissan GTR cost? ▾



# Conversational search

- *natural language processing*
- konverzace jako dotazování
- Conversational Search Agents (CSA)
- chatboti, hlasoví asistenti





# Conversational search

„As conversational agents like Siri and Alexa gain in popularity and use, conversation is becoming a more and more important mode of interaction for search. Conversational search shares some features with traditional search, but differs in some important respects: conversational search systems are less likely to return ranked lists of results (a SERP), more likely to involve iterated interactions, and more likely to feature longer, well-formed user queries in the form of natural language questions. “


<https://doi.org/10.1145/3451160>

### How am I doing?: Evaluating **conversational search** systems offline

[PDF] acm.org

[A Lipani](#), [B Carterette](#), [E Yilmaz](#) - ACM Transactions on Information ..., 2021 - dl.acm.org

... Because of these differences, traditional methods for **search** evaluation (such ... **conversational search**. In this work, we propose a framework for offline evaluation of **conversational search**...

☆ Uložit  Citovat Počet citací tohoto článku: 23 Související články Všechny verze (počet: 6)

### Analysing mixed initiatives and **search** strategies during **conversational search**

[PDF] acm.org

[M Aliannejadi](#), [L Azzopardi](#), [H Zamani](#)... - Proceedings of the 30th ..., 2021 - dl.acm.org

... for **conversational search** – from which we instantiate different observed **conversational search** ... **conversational search** strategies and **conversational search** agents in batch/offline settings. ...


☆ Uložit  Citovat Počet citací tohoto článku: 9 Související články Všechny verze (počet: 9)

### Studying the effectiveness of **conversational search** refinement through user simulation

[PDF] harvard.edu

[A Salle](#), [S Malmasi](#), [O Rokhlenko](#)... - European Conference on ..., 2021 - Springer

... We systematically investigate the task of **conversational search** ... We present a simple yet powerful **conversational search** simulator, ... with **conversational search** refinement (Sect. 3.4). ...


☆ Uložit  Citovat Počet citací tohoto článku: 18 Související články Všechny verze (počet: 6)

### MMConv: an environment for multimodal **conversational search** across multiple domains

[PDF] acm.org

[L Liao](#), [LH Long](#), [Z Zhang](#), [M Huang](#)... - Proceedings of the 44th ..., 2021 - dl.acm.org

... On the contrary, our multimodal **conversational search** scenario involves multimodality data and ... With no real-life multimodal **conversational search** data publicly available, we use real-...

☆ Uložit  Citovat Počet citací tohoto článku: 20 Související články Všechny verze (počet: 3)

### Structured and natural responses co-generation for **conversational search**

[PDF] acm.org

[C Ye](#), [L Liao](#), [F Feng](#), [W Ji](#), [TS Chua](#) - Proceedings of the 45th ..., 2022 - dl.acm.org

Generating fluent and informative natural responses while main- taining representative internal states for **search** optimization is critical for **conversational search** systems. Existing ...


☆ Uložit  Citovat Počet citací tohoto článku: 4 Všechny verze (počet: 5)

### [HTML] Adaptive utterance rewriting for **conversational search**

[HTML] sciencedirect.com

[I Mele](#), [CI Muntean](#), [FM Nardini](#), [R Perego](#)... - Information Processing ..., 2021 - Elsevier

... Moreover, since the **search** ... **conversational search** systems. Our objective is to prove that adding missing context chosen in a proper way improves the retrieval task in **conversational** ...

☆ Uložit  Citovat Počet citací tohoto článku: 10 Související články Všechny verze (počet: 4)

# Multilingual IR

- *cross-language search*
- *cross-lingual IR (CLIR)*
- jazyková bariéra je velmi silná
- vyhledávání ve více jazycích najednou
- budování *multilingual* indexů pomocí LLM (mBERT, [XLM-R](#))
- <https://www.2lingual.com/>



„The advent of multilingual language models has generated a resurgence of interest CLIR, which is the task of searching documents in one language with queries from another. However, the rapid pace of progress has led to a confusing panoply of methods and reproducibility has lagged the state of the art.“

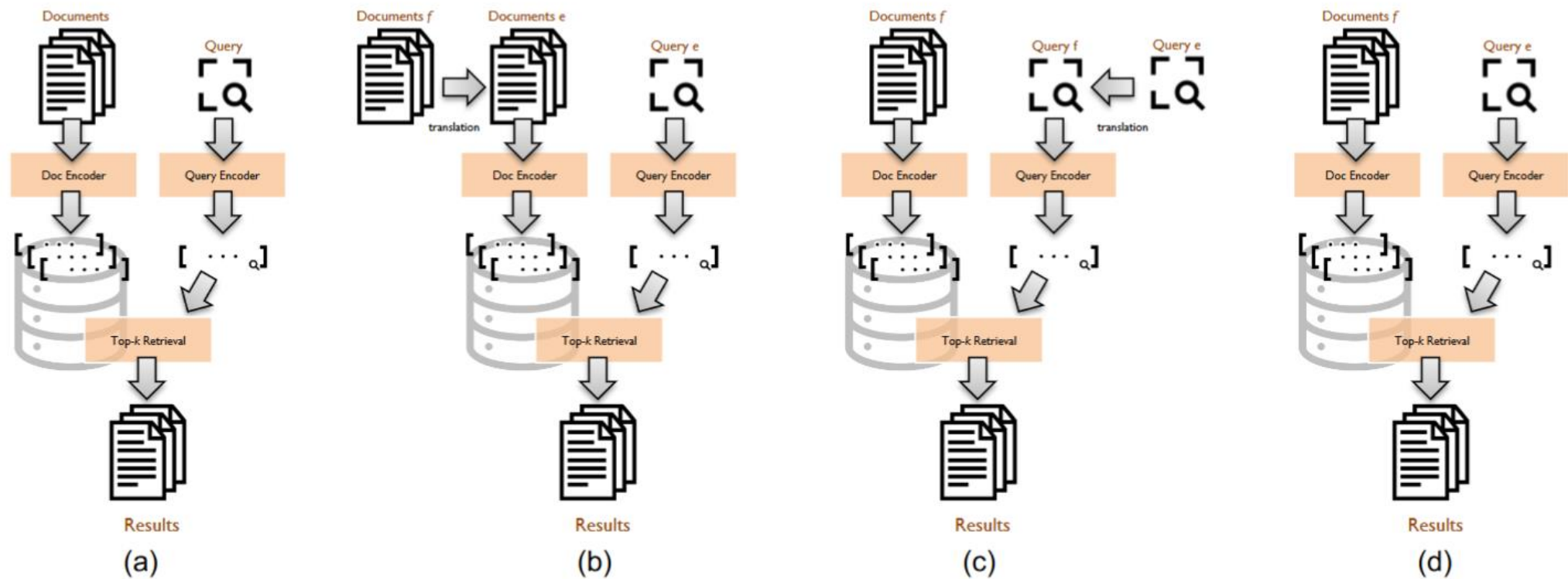
10.48550/arXiv.2304.01019



Perhaps as a side effect of the breakneck pace at which the field is advancing, we feel that there remains a lack of clarity in the IR community about the relationship between different retrieval methods (e.g., dense vs. sparse representations, “learned” vs. “heuristic” vs. “unsupervised”, etc.) and how they should be applied in different retrieval settings. Furthermore, the increasing sophistication of today’s retrieval models and the growing complexity of modern software stacks create serious challenges for reproducibility efforts. This not only makes it difficult for researchers and practitioners to compare alternative approaches in a fair manner, but also creates barriers to entry for newcomers. These issues already exist for mono-lingual retrieval, where documents and queries are in the same language. With the added complexity of cross-lingual demands, the design choices multiply (choice of models, training regimes, application of translation systems, etc.), further muddling conceptual clarity and experimental reproducibility.

10.48550/arXiv.2304.01019





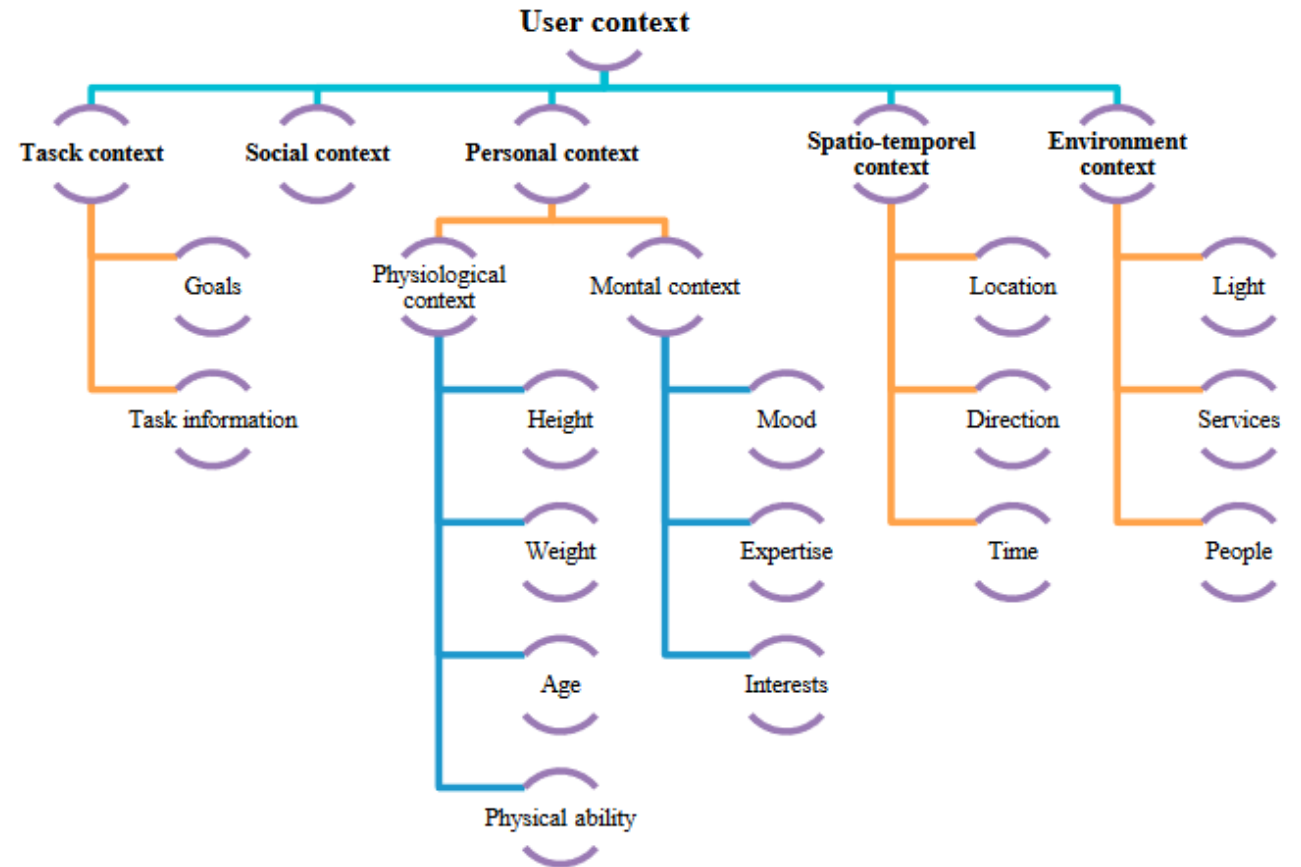
**Figure 1: Different retrieval architectures: (a) a mono-lingual bi-encoder architecture that captures both dense and sparse retrieval methods; (b) bi-encoder adapted for document translation, where all documents are translated into  $e$  and queries remain in  $e$ ; (c) bi-encoder adapted for query translation, where query  $e$  is translated into  $f$  and issued against documents in  $f$ ; (d) bi-encoder where the encoders can project content from multiple languages into the same representation space.**

# Multimodal search

- Google MUM ([Multitask Unified Model](#))
- modernější náhrada za BERT
- multimodalita: možnost kombinovat typy dokumentů v rámci query (*obrázek látky + textový popis*)
- multilingualita: automatické překlady zdrojových dokumentů

# Kontext vyhledávání

- *contextual search*
- personalizace
- subjektivita
- filter bubble
- senzory, IoT

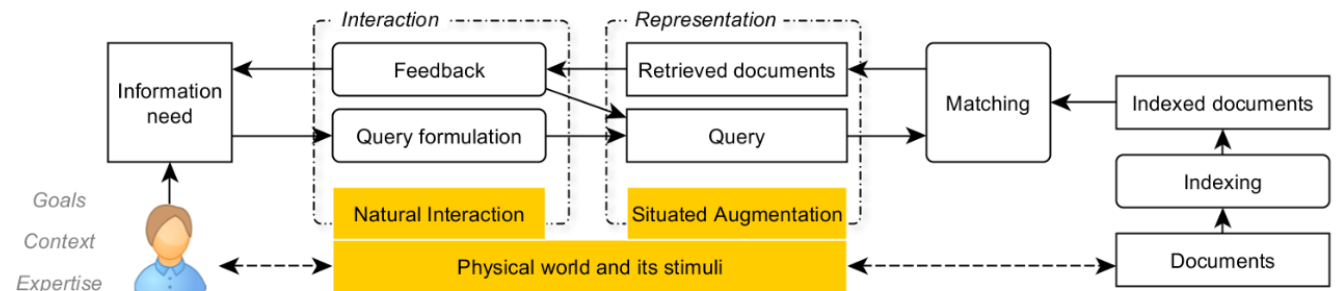
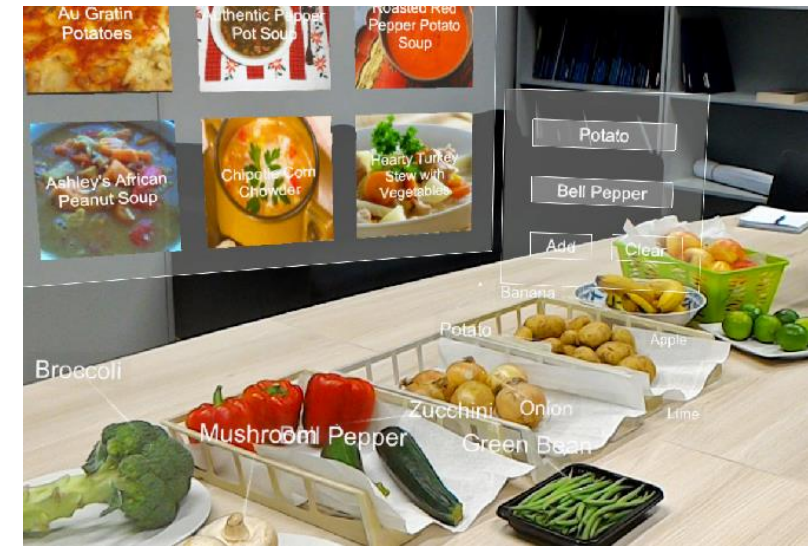


Google Previous Query  
Bing Adaptive Search



# Mobile search

- jedním z kontextů je mobilní zařízení
- vyhledávání *on-the-go*
- reality-based IR (AR)
- prezentace výsledků
- IR s *wearables* technologiemi



# Vyhledávačka

Kdy začalo být *wearables* hojněji řešeným tématem?



# Neuroadaptivní vyhledávání

- *neuroadaptive information retrieval*
- neuroinformatika – nové možnosti evaluace
- zpětná vazba skrze technologie
- modely se rozvíjejí, ale vstup je stále stejně limitovaný
- *klíčové slovo, kliknutí, hlasový požadavek*
- to jsou explicitní vstupy
- ale co implicitní vstupy?

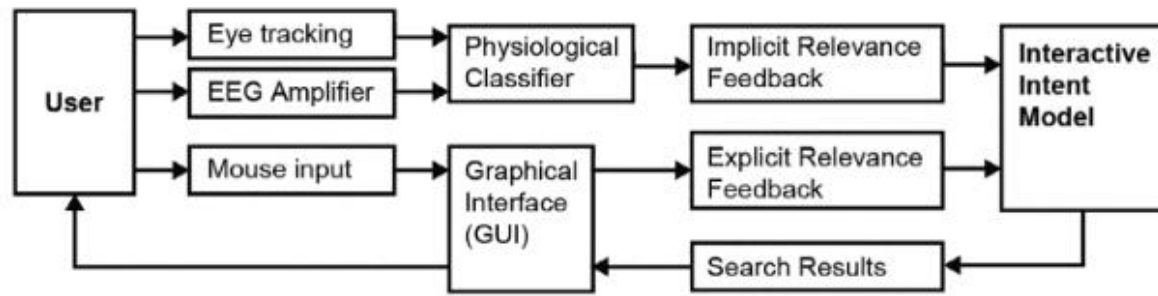


FIG. 4. Summary of the system as a control loop during the online phase.

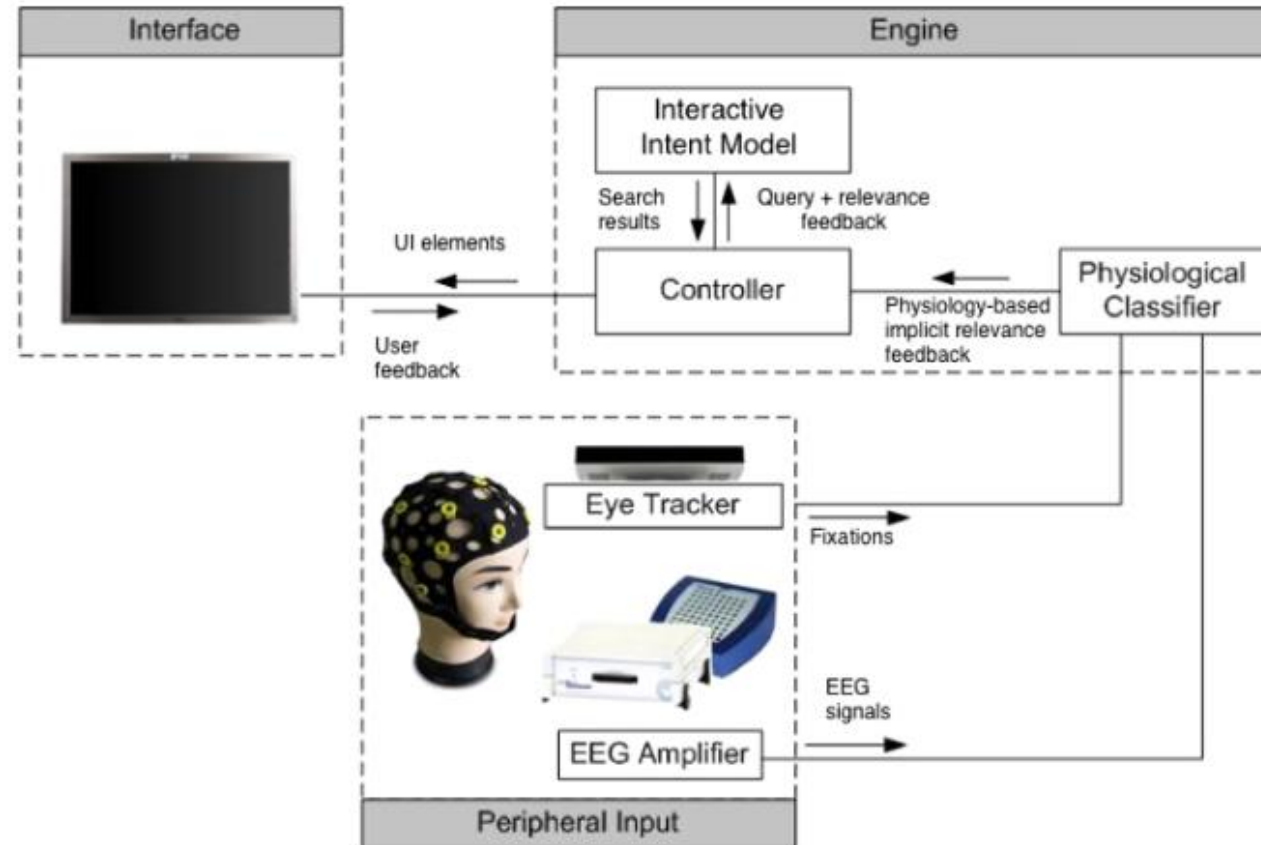
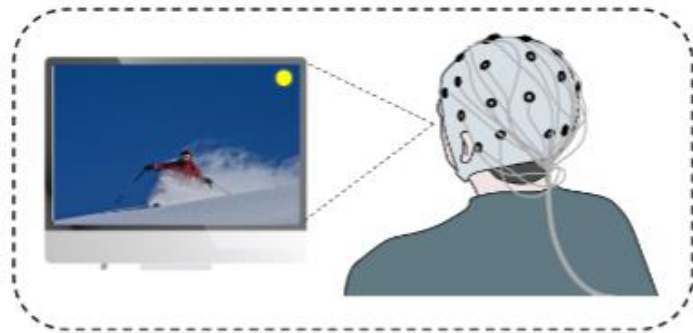
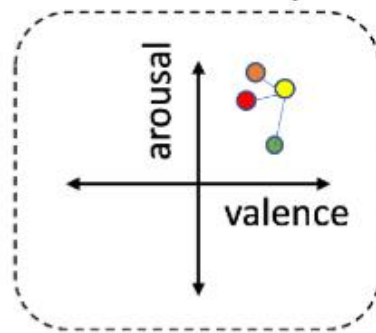


FIG. 5. Components of the system. [Color figure can be viewed at [wileyonlinclibrary.com](http://wileyonlinclibrary.com)]

Affect prediction



Affect similarity



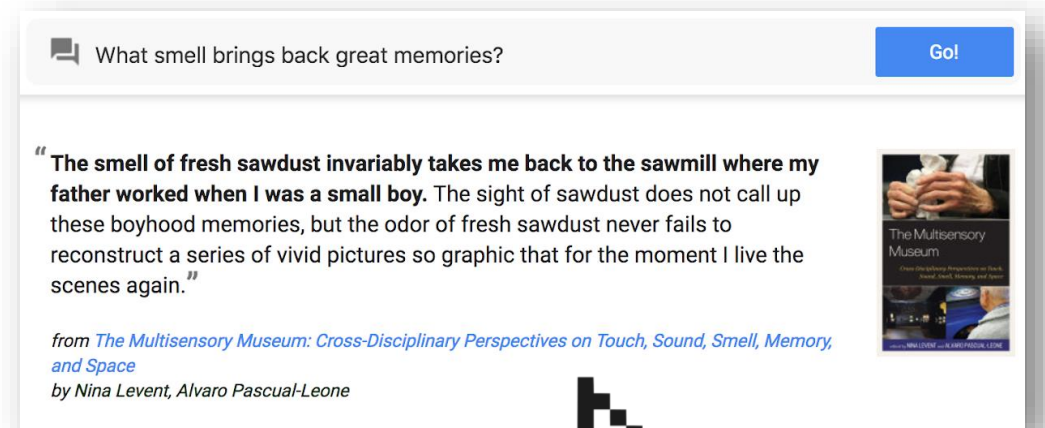
Affective ranking



<https://dl.acm.org/doi/abs/10.1145/3539618.3591946>

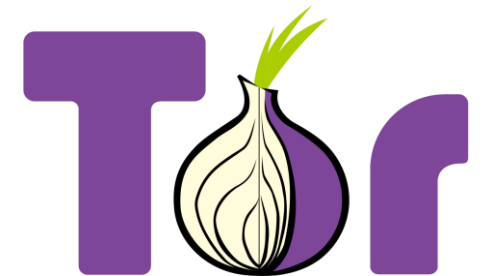
# Aplikace AI/LLM

- myšlenky již od 80. let
- neuronové sítě pro indexaci
- popis obsahu zdrojů
- hodnocení a řazení výsledků
- velké jazykové modely, NN



# Vyhledávání mimo tradiční web

- nejhlubší vrstvy webu
- hidden services (*.onion*)
- decentralizovaný web
- *splinternet*
- potíže s tvorbou indexu
- *peer-2-peer search*
- *decentralized search engine*



# Immersive Search: Interactive Information Retrieval in Three-Dimensional Space

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## ABSTRACT



## 1 INTRODUCTION AND MOTIVATION

The field of information science has looked at the presentation of search results in two-dimensional interfaces for years. However,

is the immersion that these technologies provide. A new dimension to search for information in a new area of exploration. There are further dimensions added by users as users. Elements are then spatially arranged in the non-visual information information search [1, 3, information may be done with the operating system is the common and utilize space of the visual, computing environment as those on a platform primarily to explore the have been focused on the vestibular knowledge, feature engagement

in the research proposed here of how different spatial arrangements users' interaction with the rearrangements of results designed

## PLOS ONE

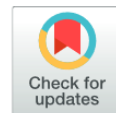
RESEARCH ARTICLE

# Information retrieval interfaces in virtual reality—A scoping review focused on current generation technology

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## Abstract

The Information Retrieval user experience has remained largely unchanged since its inception for computers and mobile devices alike. However, recent developments in Virtual Reality hardware (pioneered by *Oculus Rift* in 2013) could introduce a new environment for Information Retrieval. This paper reports the results of a Scoping Literature Review (PRISMA-ScR) by rigorously examining the entire body of relevant literature with reproducible methods. The following research questions are answered: "What prototypes and concepts of Virtual Reality Information Retrieval systems with current generation hardware exist?", "How are user interaction and especially user input realised in these systems?", "What Retrieval features are used in these systems?" and "Can these VR IR systems compare to traditional (non-VR) IR systems?". After querying Google Scholar, Scopus and Web of Science, 1042 documents were reviewed in depth. Key features and attributes of the systems are summarised and discussed. Sketches of the user interfaces are included as well. The 30 documents that were relevant to the research questions include 16 distinct systems or theories. They discuss and utilise several user input technologies, ranging from controllers, voice input or hand tracking. Although conventional retrieval features are less common, systems enable retrieval of litera-

## OPEN ACCESS

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# Zpátky k základům

- oprostit se od technologie
- vyhledávání není jen on-line



ukončení

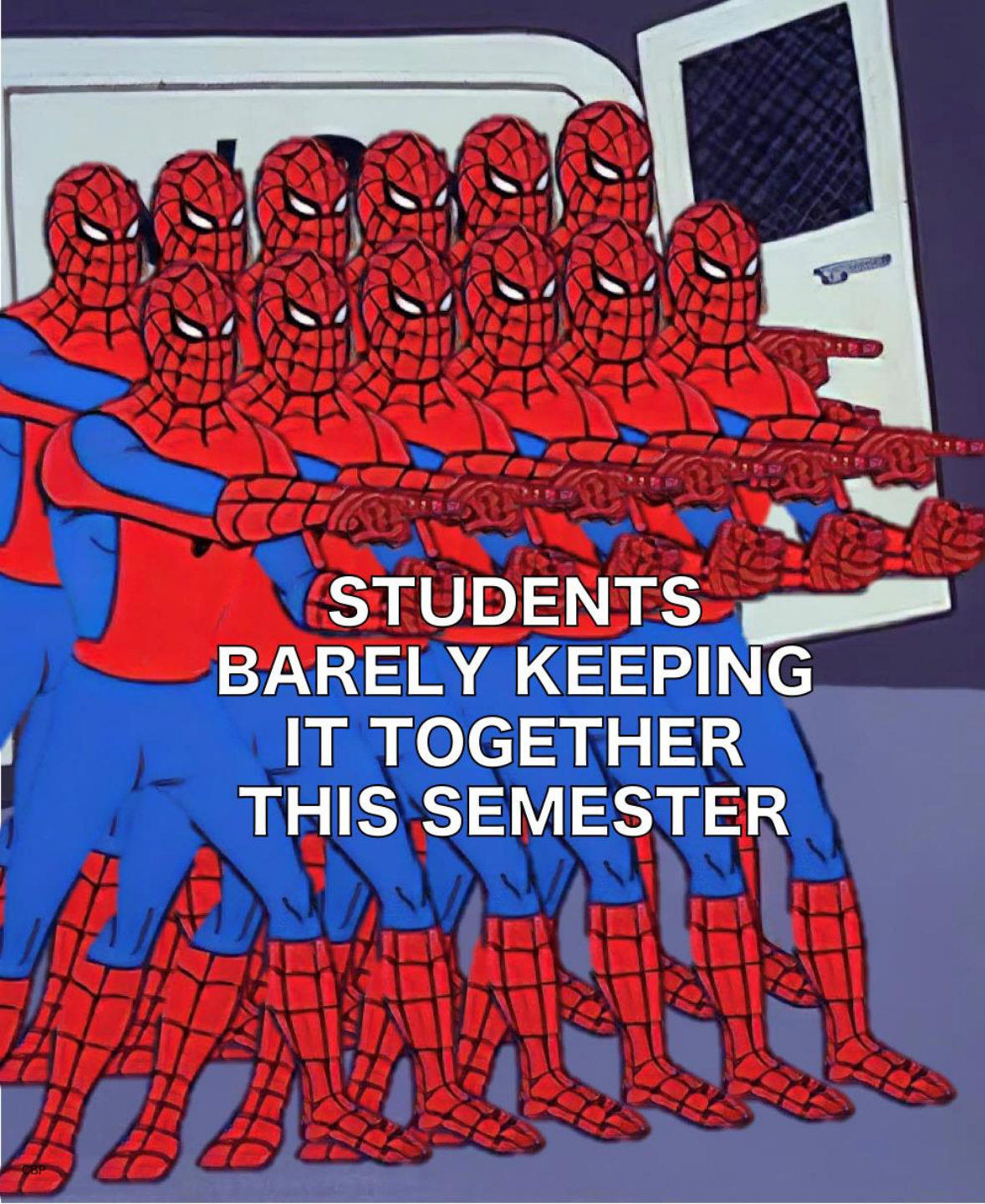
# Zkouška

## 1) zpětná vazba na rešerši

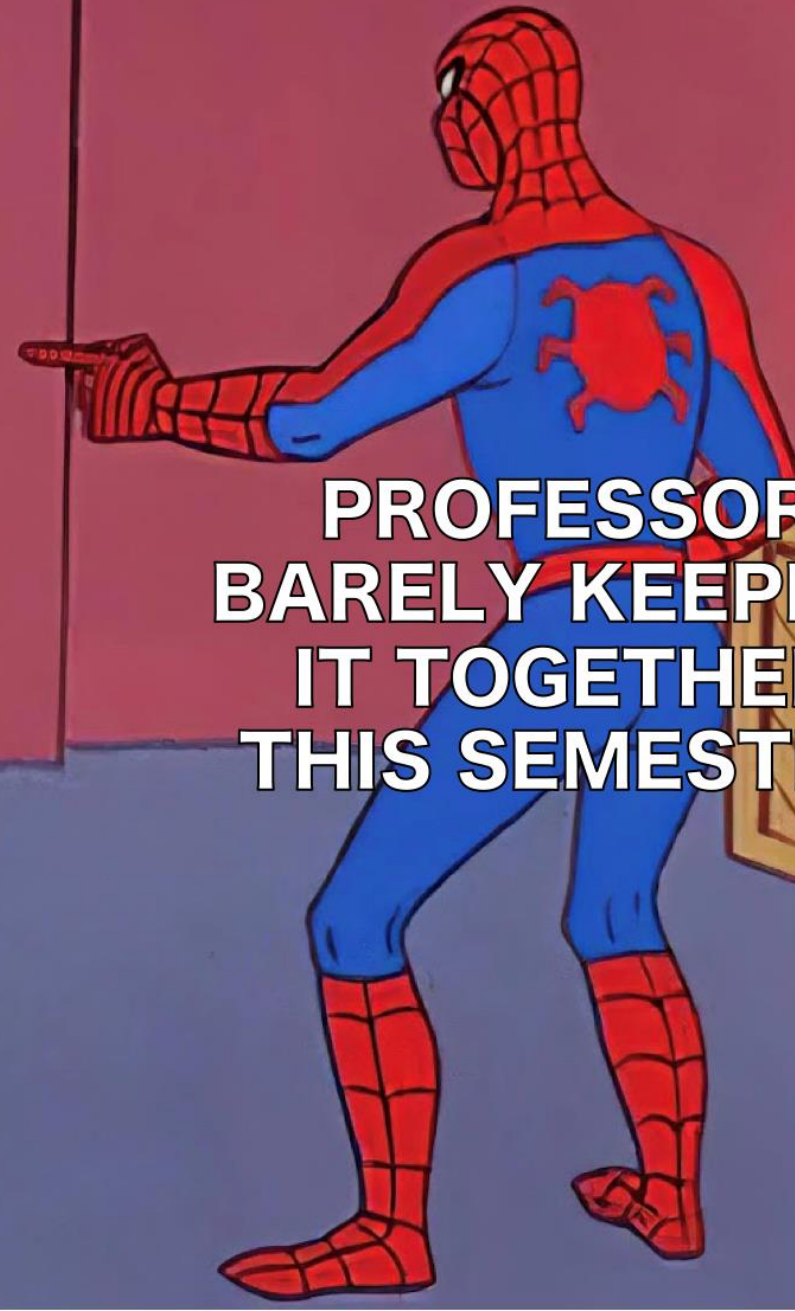
- společná hodnotící část, běžné problémy
- individuální psaná zpětná vazba
- může být vráceno k dopracování

## 2) vyhledávání zadaných dotazů

- cílem je dojít k výsledku, poskytnout odpověď
- není správný výsledek, jen různě podložená odpověď
- problémy budou stejné, *neprozrazujte si řešení*



**STUDENTS  
BARELY KEEPING  
IT TOGETHER  
THIS SEMESTER**



**PROFESSOR  
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