 IT for Science
Forum

16
Apr 24

Image by WangXiNa on Freepik

The topics

Opening

- Ronald Maier
- Ulf Busch



Artificial Intelligence, powered by Azure

- Fabian Jusufi: Introducing Azure Services at the University of Vienna
- Oliver Wieder, Christian Binder: Decoding Odor Perception with Attention-Based Graph Neural Networks through Self-Supervised Learning
- Wolfgang Klas, Mara Sophie Aichinger: Using Azure Cloud Services in the FactCheck Project



ZID Services and AI

- Janós Békési:
Data Enrichment by AI: UNIDAM as an Example



News and Feedback

- Michaela Bociurko

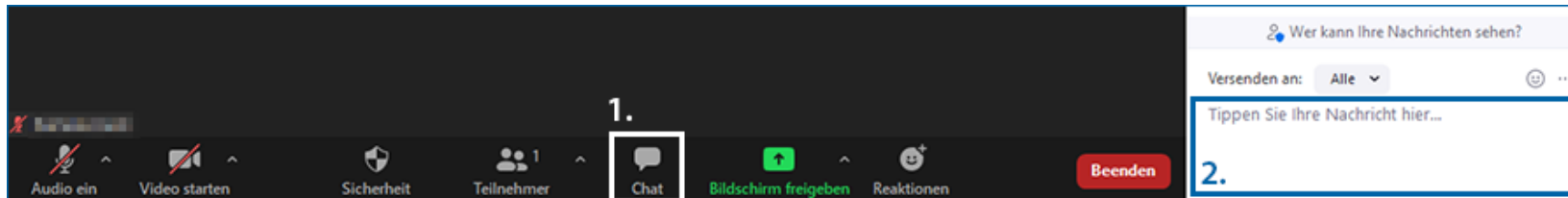
Summary and Outlook

- Ronald Maier

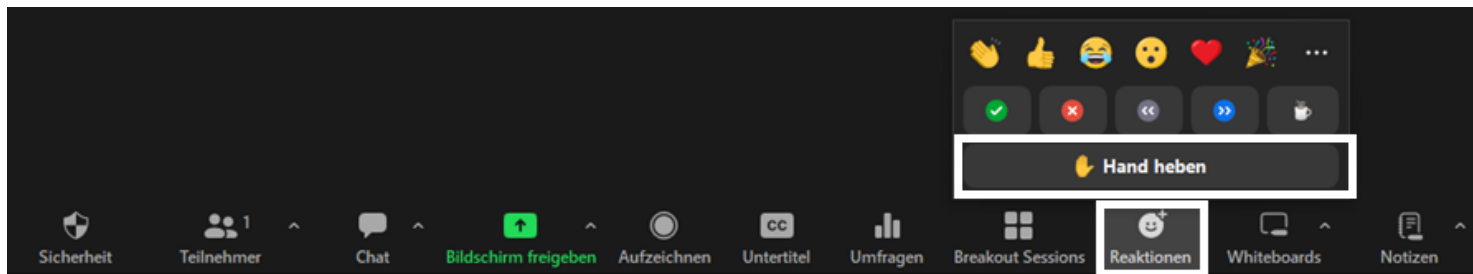


Organisational notes

- Please ask your questions as a chat comment.



- If you want to ask questions with microphone, please click the "Raise Hand" button.





Opening

- Ronald Maier
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Artificial Intelligence, powered by Azure

- Introducing Azure Services at the University of Vienna
- Decoding Odor Perception with Attention-Based Graph Neural Networks through Self-Supervised Learning
- Using Azure Cloud Services in the FactCheck Project



Introducing Azure Services at the University of Vienna

Presentation by Fabian Jusufi

What is Microsoft Azure?

- Public cloud platform from Microsoft
- Offers over 200 different services
 - **Infrastructure Service:** Classic hardware such as computing, storage & network resources
 - **Platform Services** (SaaS & PaaS): Ready to use software/applications managed by Microsoft
- Service of the ZID since February 2023
 - Employees eligible for usage
 - Pay-as-you-go with extra 15 % discount
 - zid.univie.ac.at/en/azure/



Azure AI Services



Azure OpenAI Service

Build your own copilot and generative AI applications with cutting-edge language and vision models.



Azure AI Speech

Use industry-leading AI services such as speech-to-text, text-to-speech, speech translation, and speaker recognition.



Azure AI Translator

Translate documents and text in real time across more than 100 languages.



Azure AI Search

Retrieve the most relevant data using keyword, vector, and hybrid search.



Azure AI Vision

Read text, analyze images, and detect faces with optical character recognition (OCR) and machine learning.

<https://azure.microsoft.com/en-us/products/ai-services>

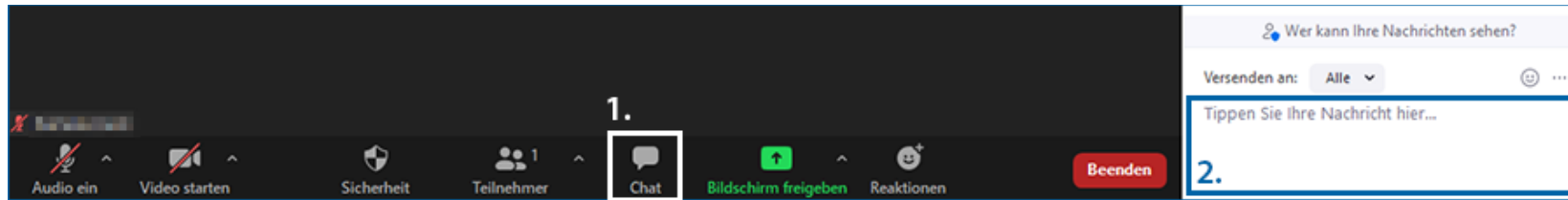
Funding for research with Azure services

- ZID funding of 22,000 euros in the summer semester 2024
 - Goal: Supporting research activities in Azure
 - Criteria: Usage of Azure services for which the ZID does not offer alternative IT services (e.g. **AI services**) or working with hybrid approaches
- Our strategy: Enabling research projects that currently cannot be realised on-premises by offering a secure environment in the cloud
 - Possibility for researchers to continue in Azure after funding period
 - zid.univie.ac.at/en/azure/funding/

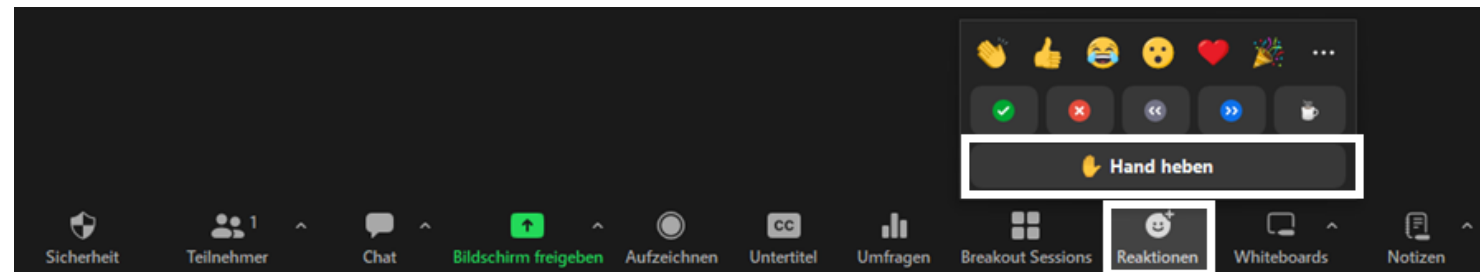
Project name	Submitter	Funding amount
FactCheck	Wolfgang Klas	4,000 €
Revolutionizing Olfactory Perception Mapping: A Contrastive Learning Graph Neural Network Approach	Oliver Wieder	4,000 €
FLEXWEB	Marina Dütsch	4,000 €
Very Large-scale Distributed Micromagnetic Research Tools	Abert Claas	2,000 €
selscape: Automated and Distributed Pipelines for Investigating the Landscape of Natural Selection from Large-scale Genomic Datasets	Xin Huang	2,000 €
MULTIREP – Multidimensional Representation: Enabling an Alternative Research Agenda on the Citizen-Politician Relationship	Dylan Paltra	2,000 €
Controlled Machine Translation with Large Language Models for the Technical Domain	Miguel Angel Rios Gaona	2,000 €
Determining Scientific Uncertainty in Academic Publications	Petro Tolochko	2,000 €

Questions about Introducing Azure Services at the University of Vienna

- Please ask your questions as a chat comment.



- If you want to ask questions with microphone, please click the "Raise Hand" button.



© Image by storyset on Freepik

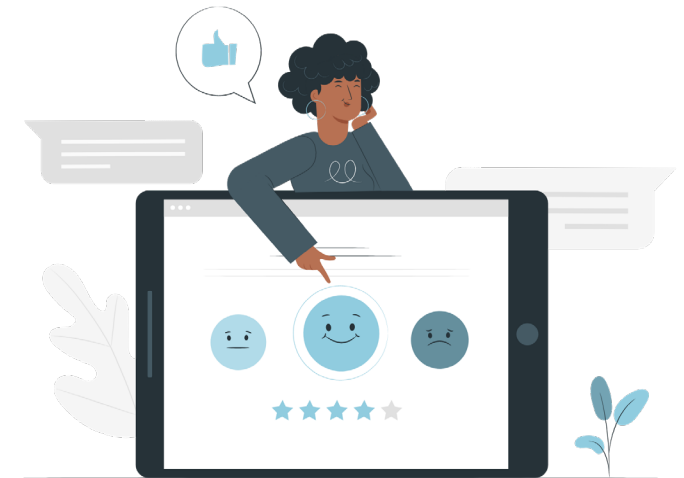
Decoding Odor Perception with Attention-Based Graph Neural Networks through Self-Supervised Learning

Presentation by Christian Binder and Oliver Wieder



Main objective

**Link and highlight molecular features
to odor perception**



© Image by storyset on Freepik

Odor perception importance

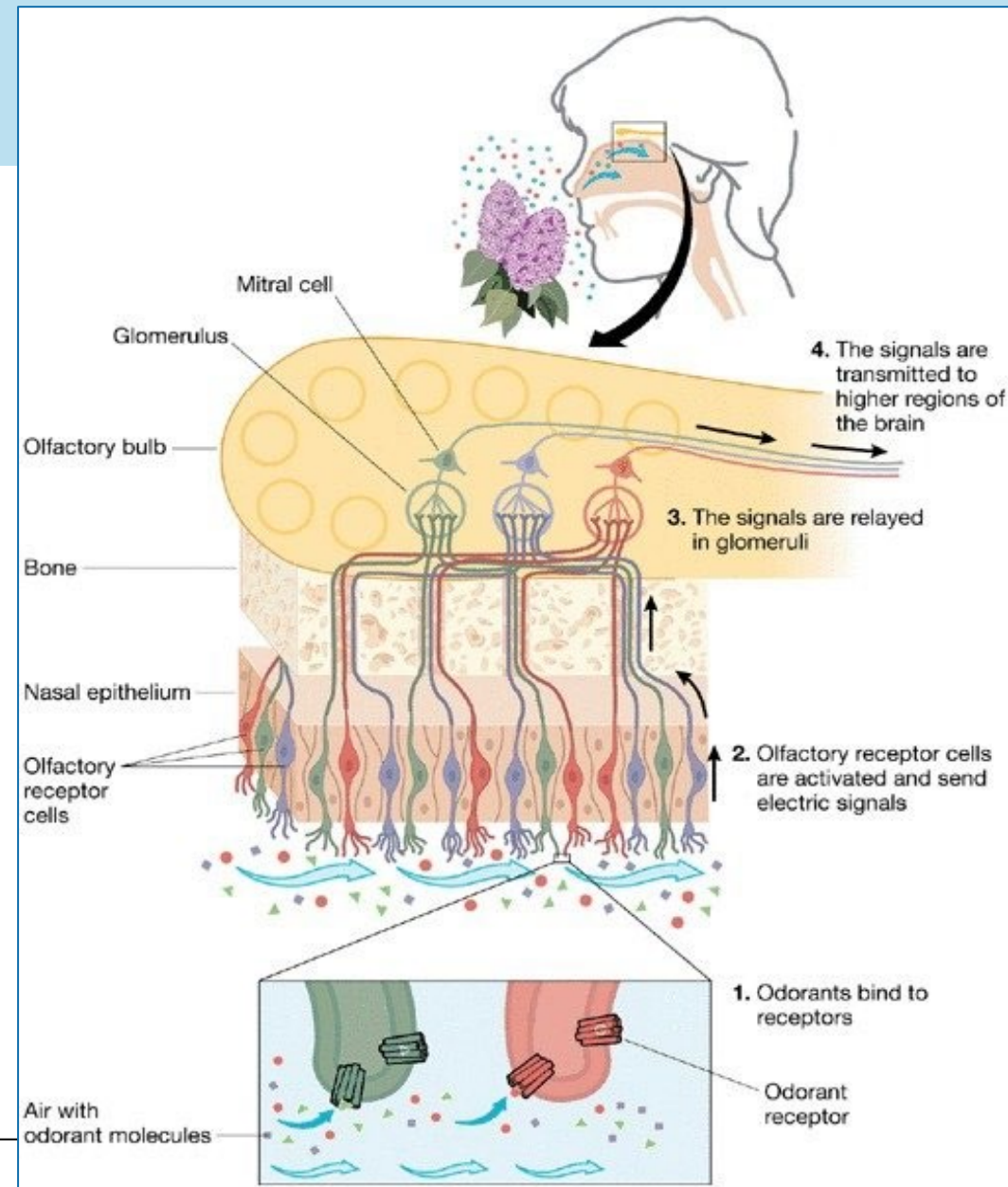
- Fragrance and flavour development
- Environmental monitoring
- Food and safety monitoring
- Healthcare and medicine



© Image by storyset on Freepik

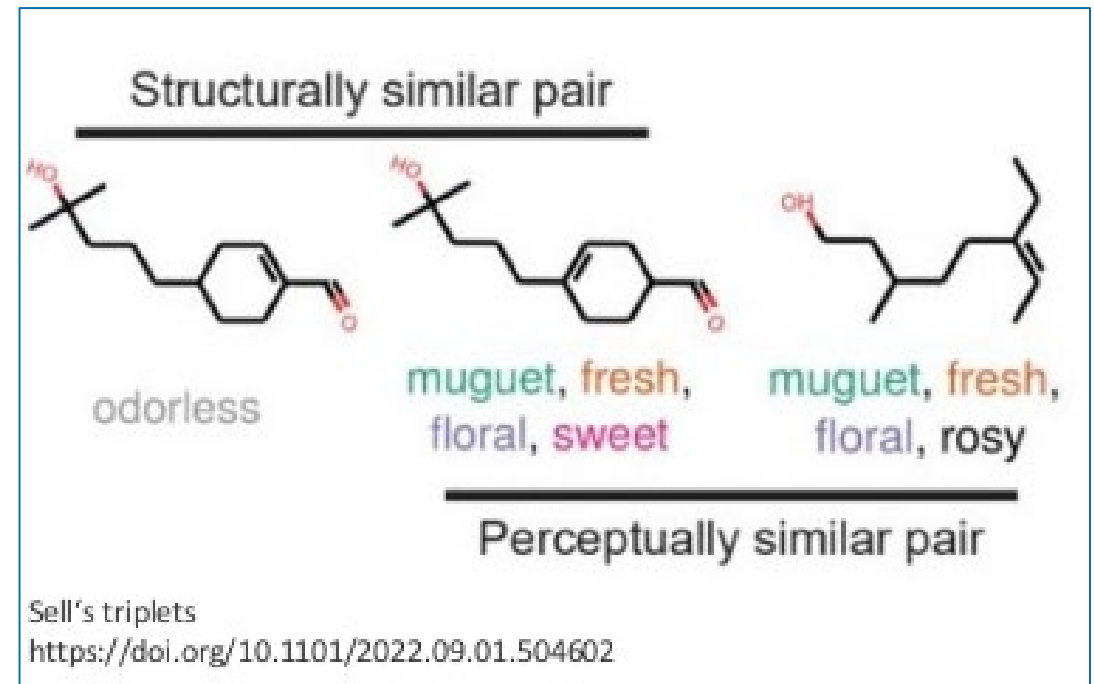
Odor perception challenges

- 400 odor receptors (GPCRs)
- Multi-sensory data
- Subjectivity of perception



Odor perception challenges

- Complex interaction
 - Relationship between structure and odor
- Data scarcity
 - Proteins and odor structures



Odor perception challenges

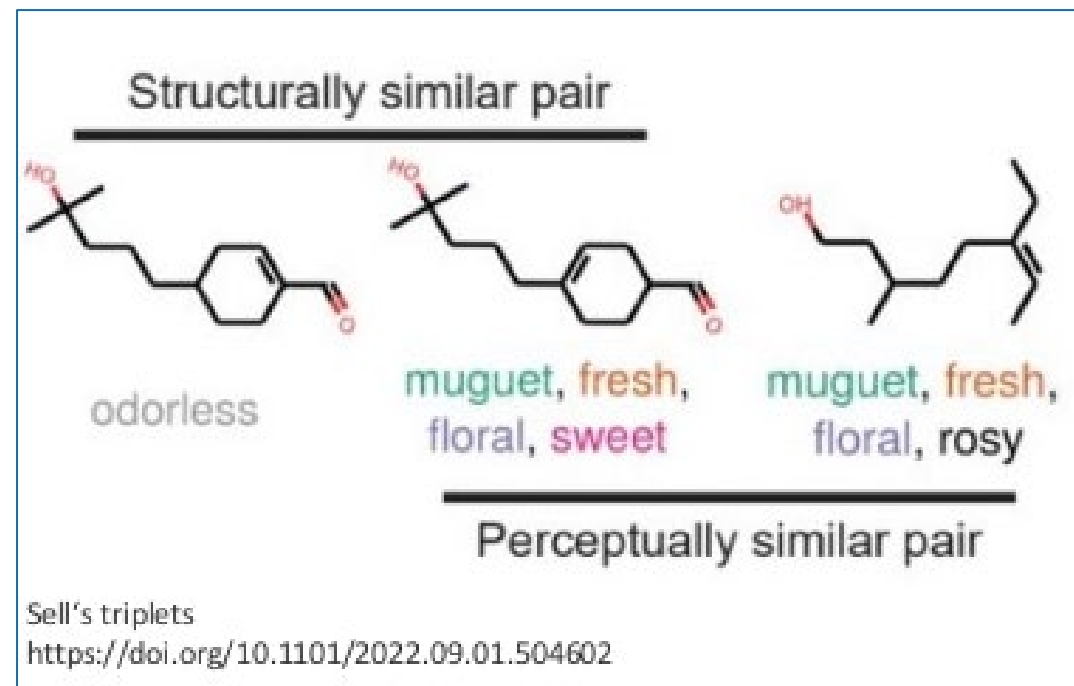
Highly complex relationship meets
data scarcity



© Images by storyset on Freepik

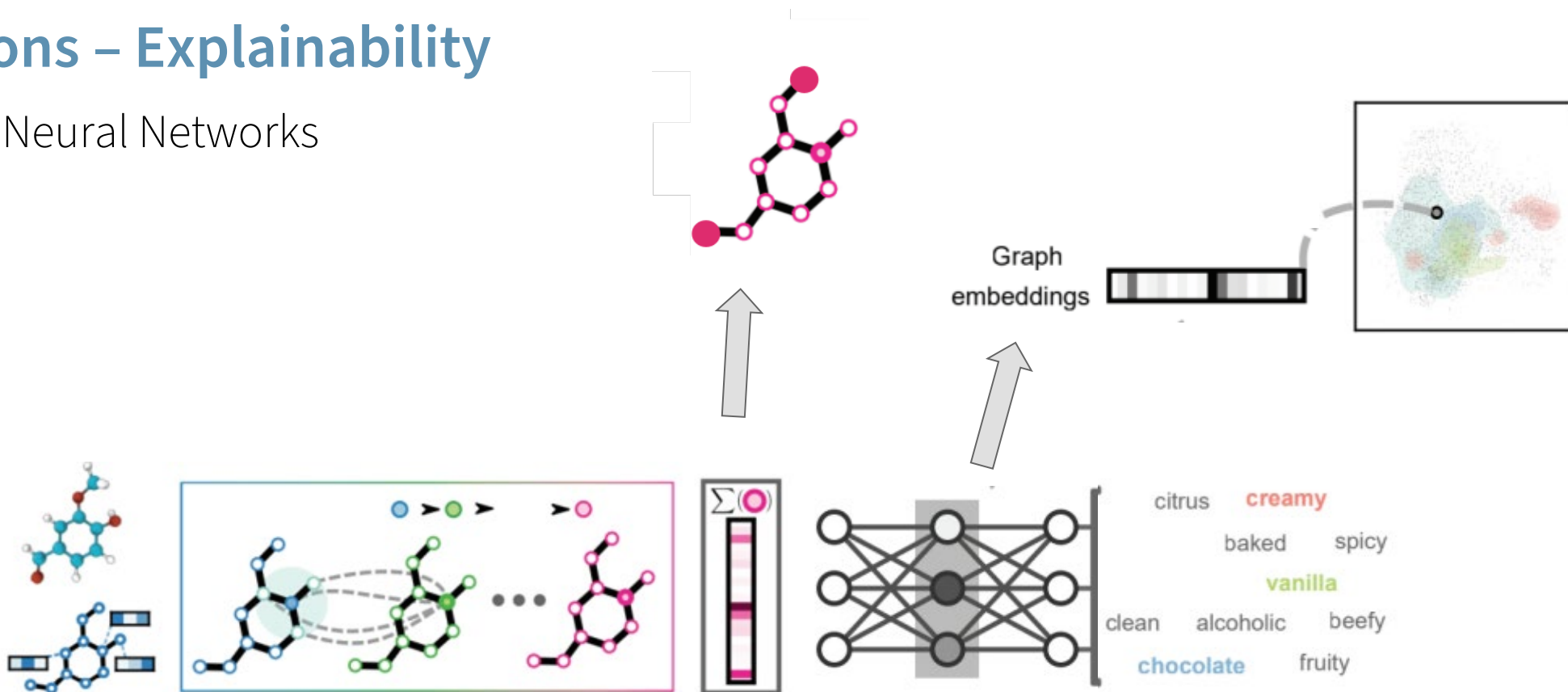
Considerations for developing the algorithm

- Not enough protein information available
- Which molecule inherent features (3D, bond, atom, and molecule info) are necessary?
- Explainable architecture



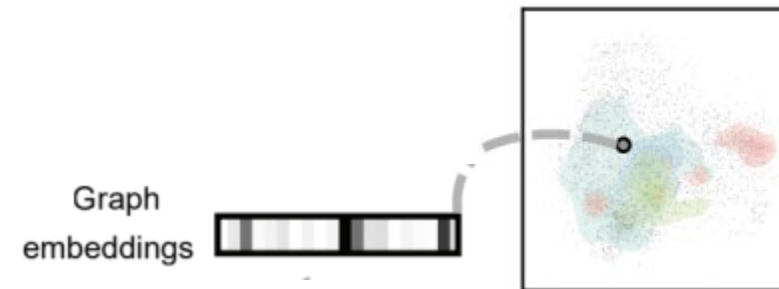
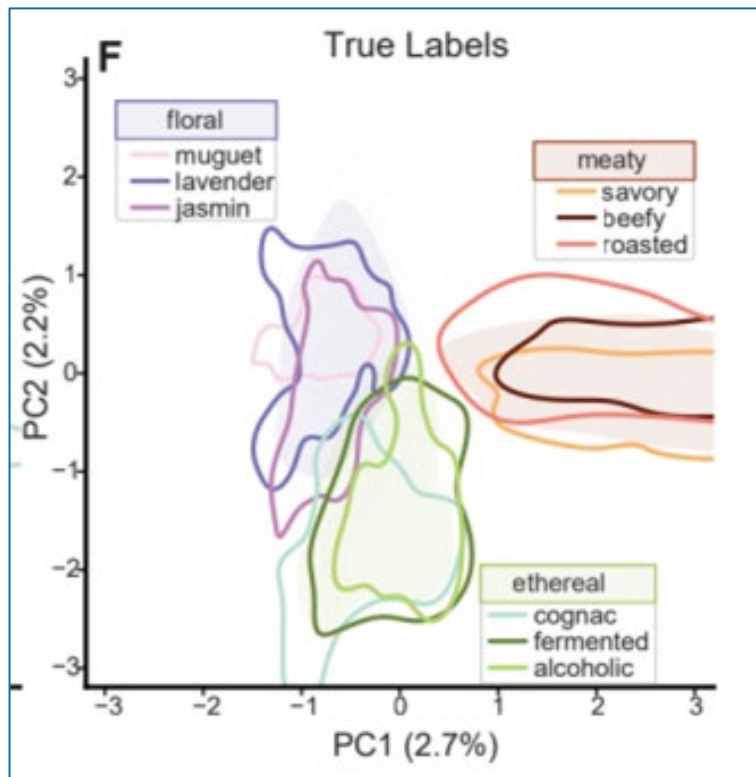
Considerations – Explainability

Graph Attention Neural Networks



<https://www.biorxiv.org/content/10.1101/2022.09.01.504602v4.full.pdf>

Considerations – Embeddings



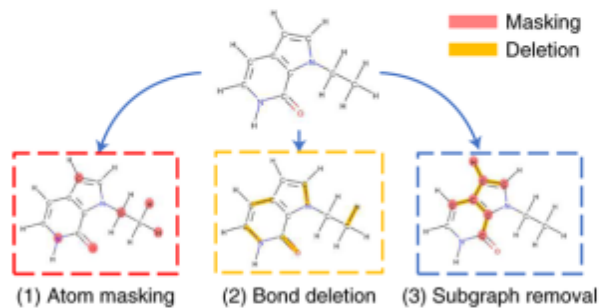
<https://www.biorxiv.org/content/10.1101/2022.09.01.504602v4.full.pdf>

Considerations – Data scarcity

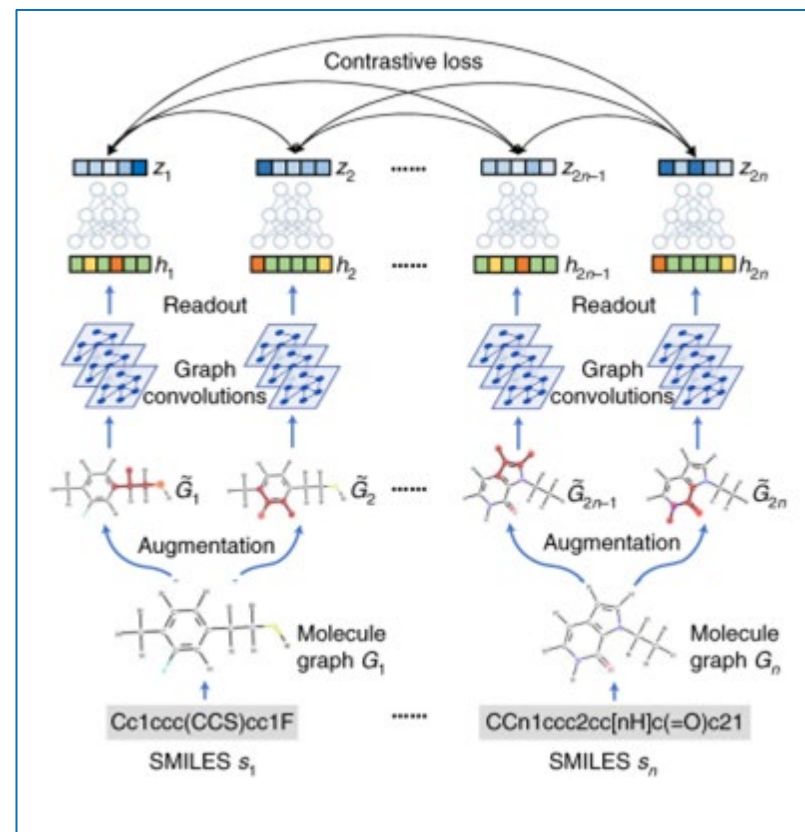
Self-supervised learning

Self-supervised learning

1. Pre-train on millions of molecules
2. Fine-tune on labeled data

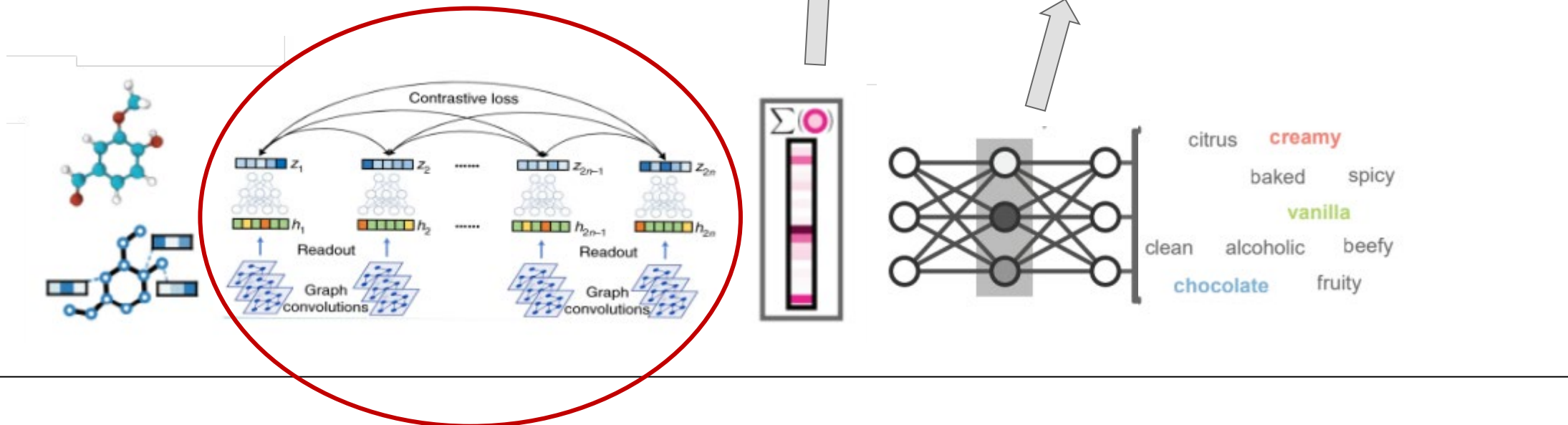


Images from MolCLR (left: molecule augmentation, right: model training)
<https://doi.org/10.1038/s42256-022-00447-x>



Our approach

- Pre-training:
 - Millions of molecules



Our approach

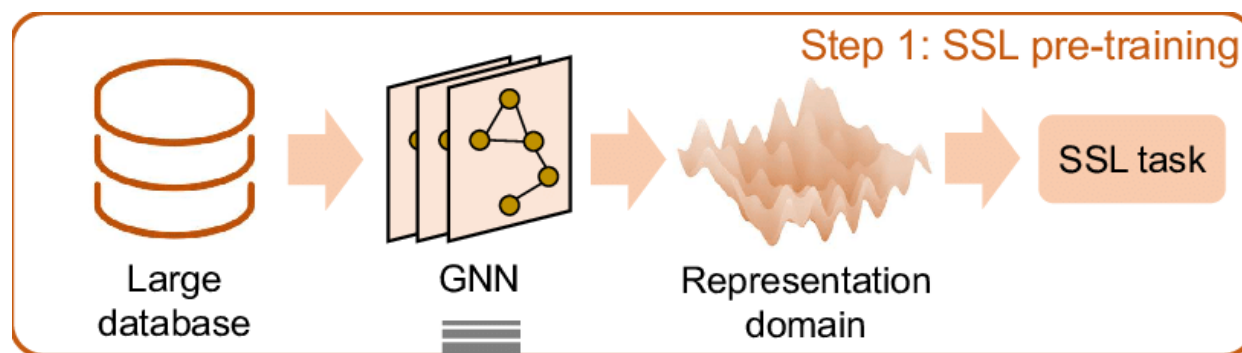
Pre-training

- Predicted with POM (Principal Odor Map) model
- “Low quality” labels
- Focus on contrastive loss



Considerations – 2 training phases

Pre-training

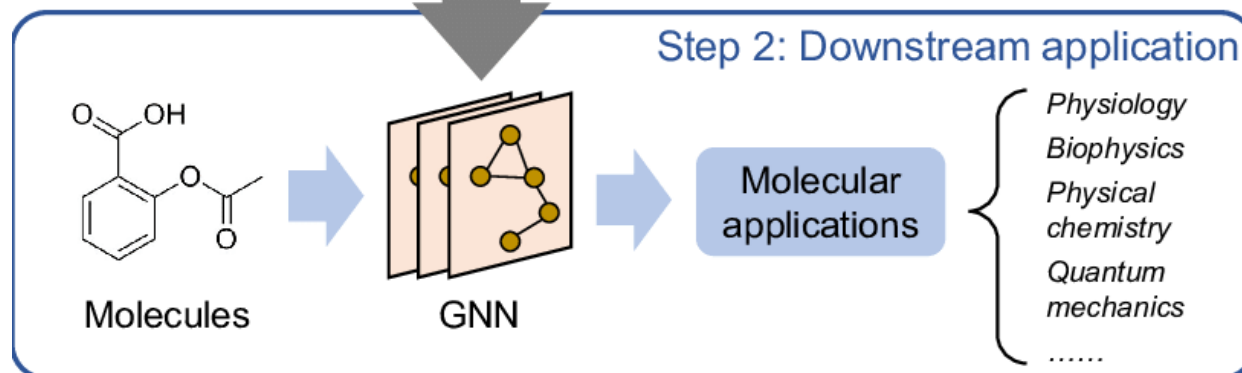


GNN = Graph Neural Networks

SSL = self-supervised learning

Parameter sharing

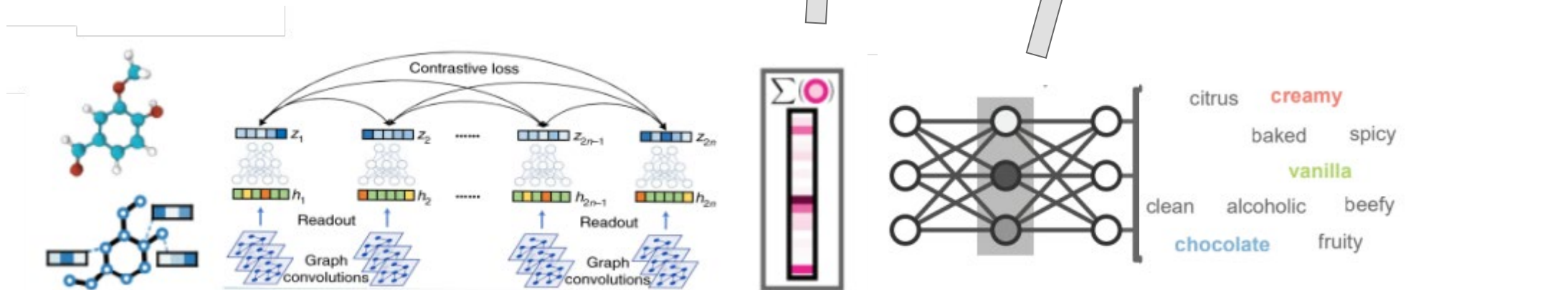
Fine-tuning



Our approach

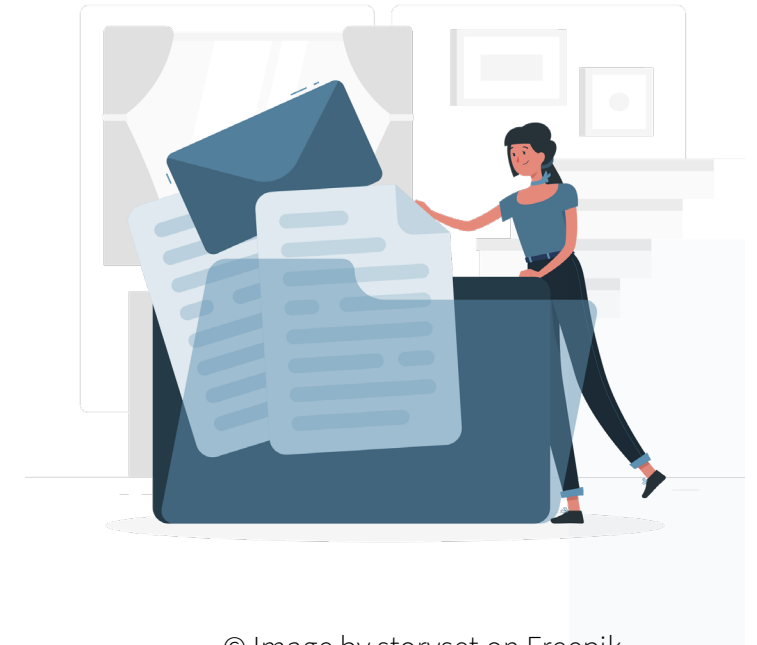
Fine-tune

- 5,000 high quality data points
- Focus on labels



Odor perception challenges – Summary

- Self-supervised learning with Classifier
 - Pre-training
 - Fine-tuning
- Attention for explainability



© Image by storyset on Freepik

Azure

POM prediction and training

- Azure cloud infrastructure
- GPU-enabled VMs (NVIDIA)

```

File Edit View Search Terminal Help
odormap-003-admin@odormap-vm-003:~$ nvidia-smi
Mon Apr 1 12:33:00 2024
+-----+
| NVIDIA-SMI 535.161.07                Driver Version: 535.161.07   CUDA Version: 12.2   |
+-----+-----+-----+-----+-----+-----+
| GPU  Name      Persistence-M   Bus-Id        Disp.A    Volatile Uncorr. ECC   |
| Fan  Temp        Perf         Pwr:Usage/Cap     Memory-Usage  GPU-Util  Compute M. |
|                                           MIG M.         |
+-----+-----+-----+-----+-----+-----+
|   0   NVIDIA A100 80GB PCIe      Off          00000001:00:00:0 Off      0          0         |
| N/A   32C        P0              42W / 300W           0MiB / 81920MiB    0%        Default |
|                                           Disabled      |
+-----+-----+-----+-----+-----+-----+
+-----+
| Processes:                               |
| GPU   GI    CI          PID    Type    Process name                        GPU Memory |
|      ID   ID                                 |              |
+-----+-----+-----+-----+-----+-----+
| No running processes found              |
+-----+
odormap-003-admin@odormap-vm-003:~$

```

NVIDIA A100	24 Cores	4:12 min Training	4.13 €/h
NVIDIA Tesla T4	4 Cores	6:19 min	0.55 €/h

Special thanks to:

Cheminformatics Research Group

- Prof. Thierry Langer
- Daniel Rose, M.Sc. M.Sc.
- Christian Binder B.Sc
- Dr. Thomas Seidel

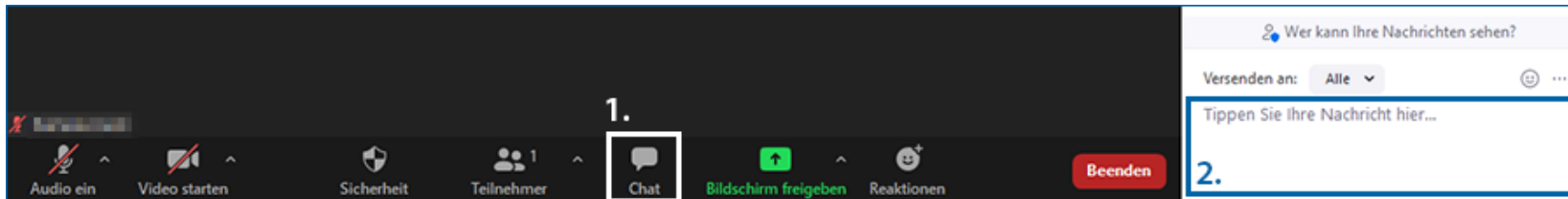
Christian Doppler Laboratory for Molecular Informatics in the Biosciences (CD-Lab MIB)

ZID

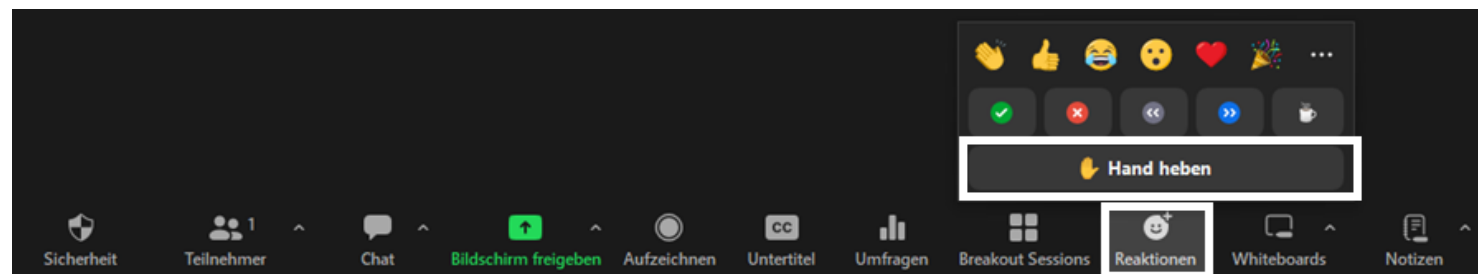


Questions about Decoding Odor Perception with Attention-Based Graph Neural Networks through Self-Supervised Learning

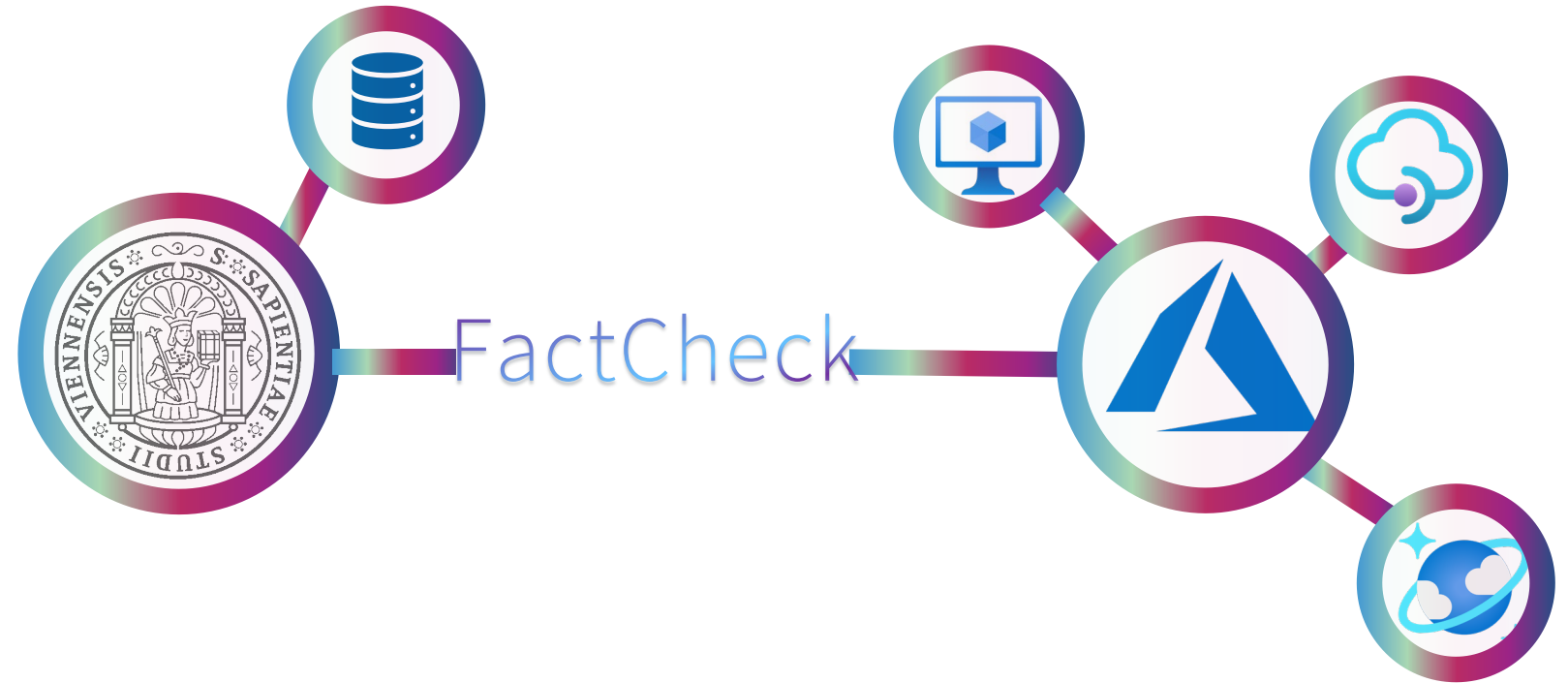
- Please ask your questions as a chat comment.



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© Image by storyset on Freepik



Using Azure Cloud Services in the FactCheck Project

Presentation by Wolfgang Klas and Mara Sophie Aichinger

Speakers



Wolfgang Klas



Mara Sophie Aichinger

Further team

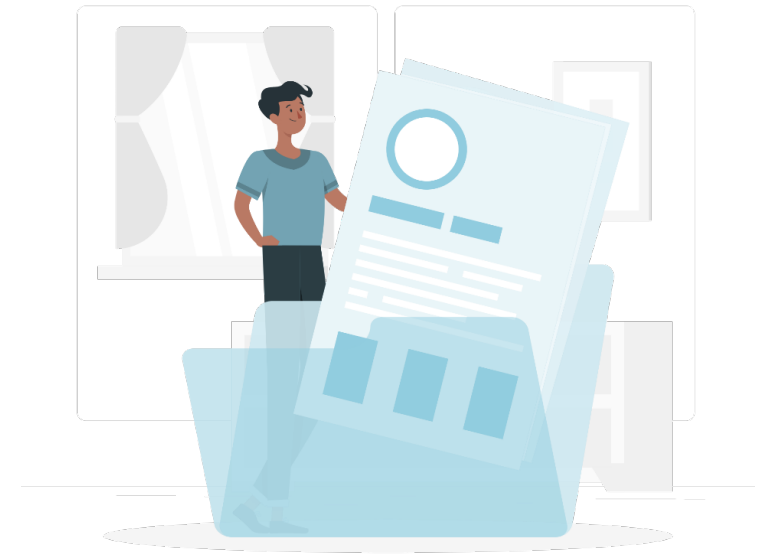
- Daniel Berger
- Adrian Hofer
- Peter Kalchgruber

Agenda

- The FactCheck Framework
- FactCheck & Azure

The FactCheck Framework

Introduction to the Research Context



Conflicting Information on the Web

Students: Student numbers in 2022/2023

84,600

Students

12,600

Every winter semester, approximately 12,600 students begin their studies at the University of Vienna.



63
of stud



ABOUT UNIVERSITY OF VIENNA

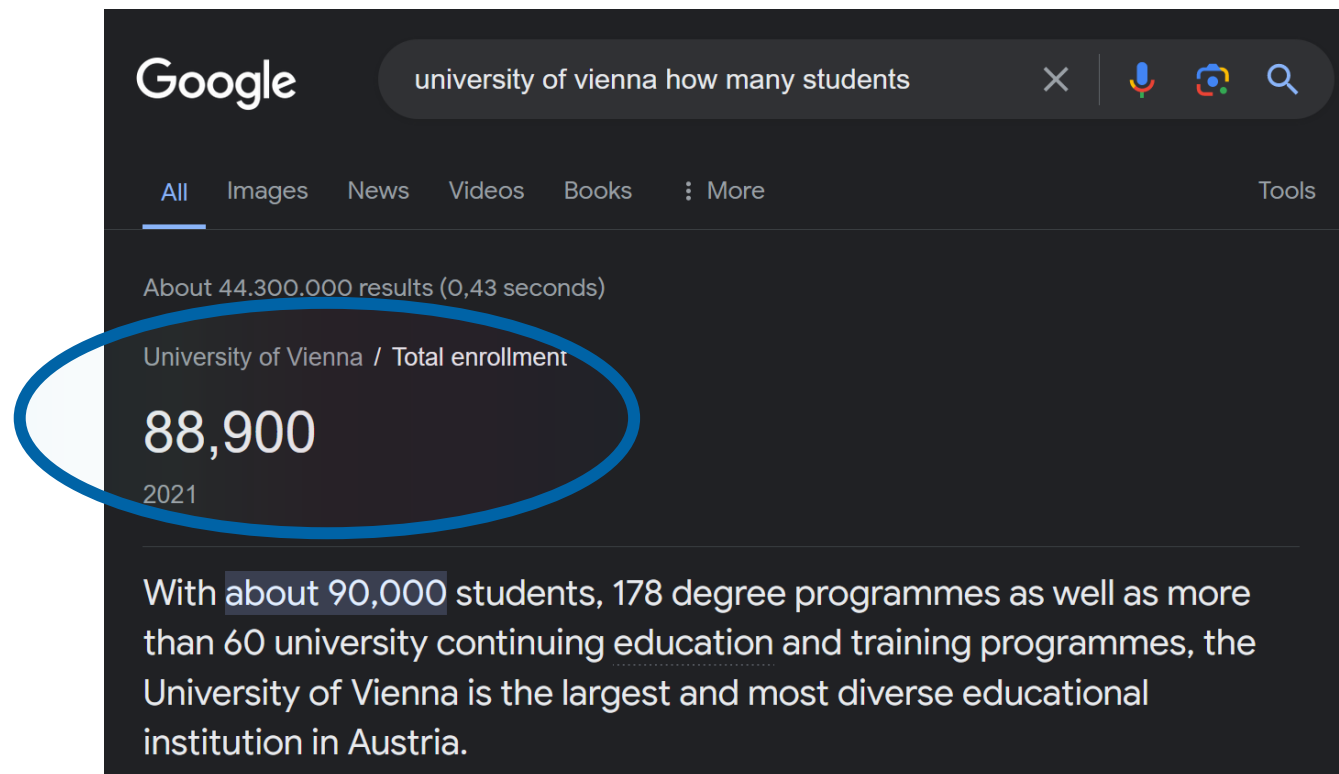
The University of Vienna was founded in 1365 by Rudolph IV, Duke of Austria, and modelled on the Sorbonne in Paris.

Home to more than 94,000 students - 18,000 international students among them - it is the oldest university in the German-speaking world and the largest research institution in Austria.

www.timeshighereducation.com/world-university-rankings/university-vienna

www.univie.ac.at/fileadmin/user_upload/startseite/Dokumente/2023_UW_in_Zahlen_EN_1_.pdf

Conflicting Information on the Web



The screenshot shows a Google search interface with the query 'university of vienna how many students'. The search results indicate approximately 44.3 million results. A prominent result is circled in blue, showing 'University of Vienna / Total enrollment' with a value of '88,900' for the year '2021'. Below this, a text snippet states: 'With about 90,000 students, 178 degree programmes as well as more than 60 university continuing education and training programmes, the University of Vienna is the largest and most diverse educational institution in Austria.'

Google

university of vienna how many students

All Images News Videos Books : More Tools

About 44.300.000 results (0,43 seconds)

University of Vienna / Total enrollment

88,900

2021

With about 90,000 students, 178 degree programmes as well as more than 60 university continuing education and training programmes, the University of Vienna is the largest and most diverse educational institution in Austria.

Information on the Web: Challenges

- Finding information and **facts**
- Time dimension: how **“up to date”** are the data?
- **Heterogeneity and abstraction** level of information
 - Rounding (e.g. “about 90,000 students”)
 - Time/number formats
- **Trust** aspect



Image by storyset on Freepik

FactCheck: Introduction

- Toolkit for **exploring and detecting inconsistent** related data on the web
- Ongoing research topic at **Multimedia Information Systems (MIS)** group
- **Prototype** currently hosted mostly on-premises, partially on Azure



Image by storyset on Freepik

FactCheck: Research Aspects

- **Extraction** of information/facts on the web
 - Entity resolution/topic extraction
 - Extracting facts from text or multimedia content (e.g. videos)
- Context-aware **comparison** of information/facts
- Crowd-sourced **conflict detection**

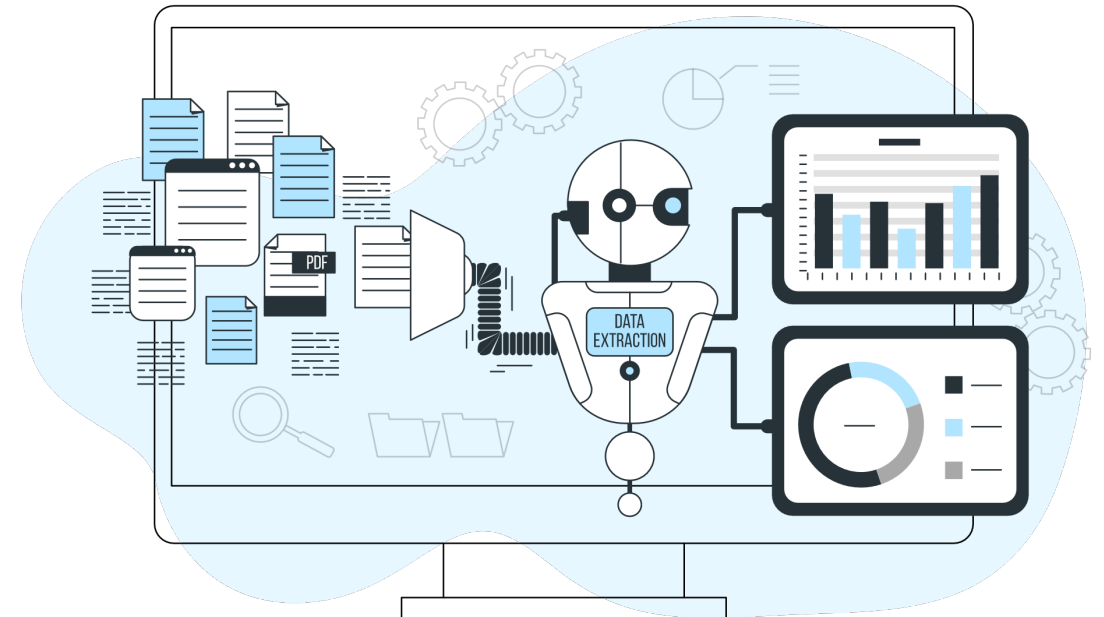


Image by storyset <https://storyset.com>

FactCheck & Azure

Hybrid Cloud Computing in Research



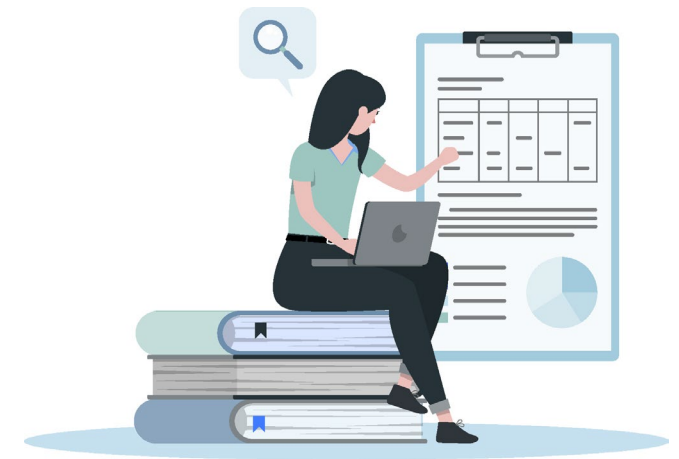
Azure / Cloud Computing for Research

- **Scalability:** prototype can easily scale horizontally (more instances) and vertically (better hardware)
- **Elasticity:** scale up and down dynamically to meet current demands
- **Availability:** high availability backed by Service-Level Agreements (99.9%+ uptime)
- **Fault tolerance and disaster recovery:** suitable replication and backup in case of emergency
- **Cost-efficiency:** economies of scale and consumption-based billing
- **Use of cloud-based services** such as, e.g.
 - Artificial Intelligence (AI)
 - Natural Language Processing (NLP)



Hybrid Approach

- Joint use of **on-premises and Azure infrastructure**
- **Combines benefits** of cloud computing and on-premises deployment
- Allows for research data to be **stored and processed on-premises**
- Allows for use of **local infrastructure** (e.g. databases, VMs) if more cost-efficient
- Needed also in the **development** phase of the system



© Image by storystet on Freepik

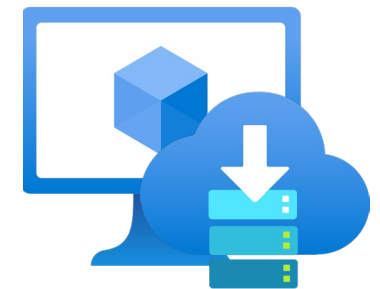
Current Work Packages: Cluster 1 – Hybrid Architecture

- **1.1** – Use of Azure API Management as central point to expose and test our API
- **1.2** – Implement secure connection between on-premises and Azure services
- **1.3** – Reimplement parts of on-premises prototype as cloud-native microservices (Azure Functions)
- **1.4** – Migrate parts of locally hosted data storages to Azure CosmosDB



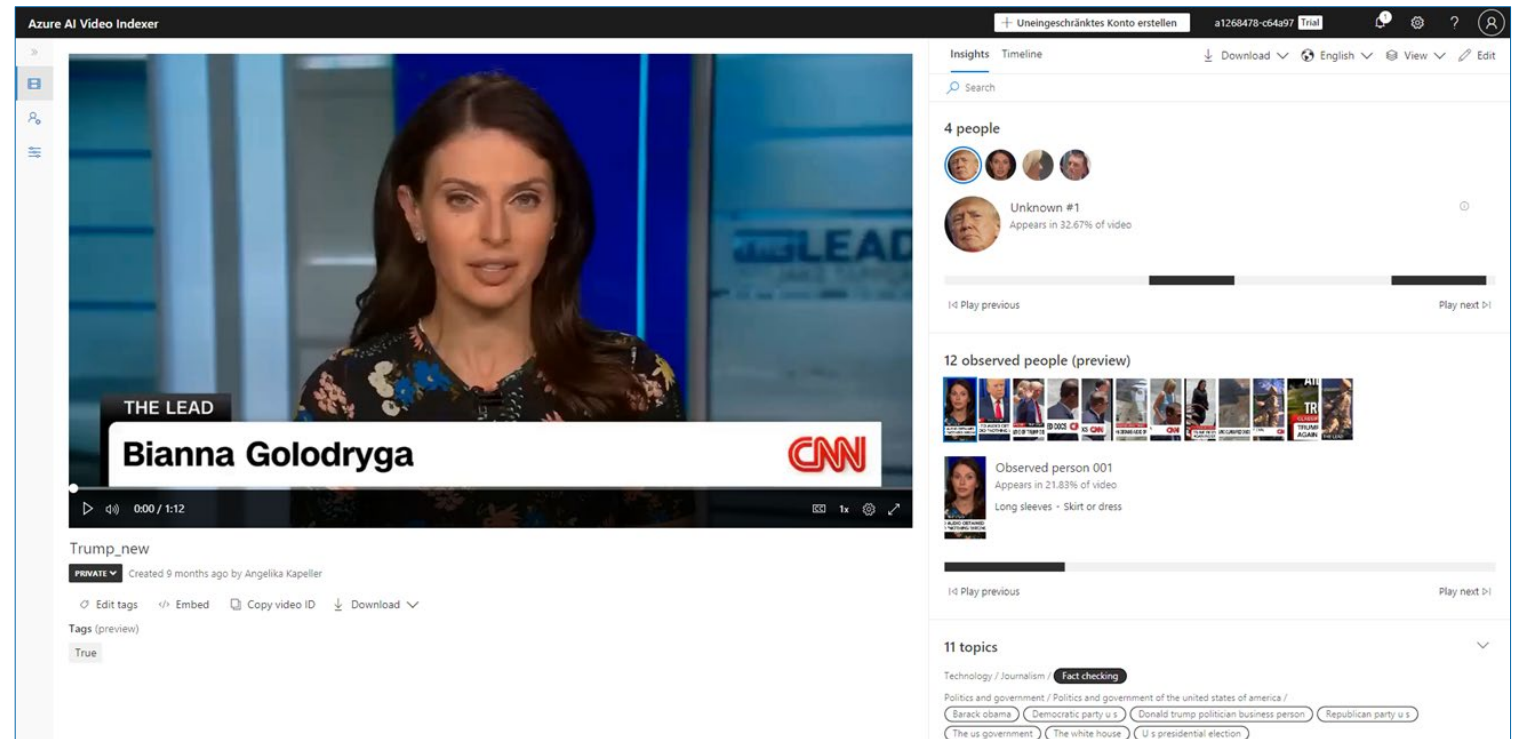
Current Work Packages: Cluster 2 – Fact Extraction

- **2.1** – Extraction of information from video material using Azure AI Video Indexer
- **2.2** – Dynamic and scalable collection of information from the web (“crawling”)



WP 2.1 – Fact Extraction from Videos

- **Main service:**
Azure AI Video Indexer
- **Extraction** of information from unstructured video material
- **Leverages** Azure's mature AI services



The screenshot displays the Azure AI Video Indexer interface. The main video player shows a news segment with the title "THE LEAD" and the name "Bianna Golodryga" overlaid. The video is from CNN and has a duration of 0:00 / 1:12. Below the video, the title "Trump_new" is visible, along with options to edit tags, embed, copy video ID, and download. The interface also shows a list of tags (preview) with "True" selected. On the right side, there are sections for "4 people" (including "Unknown #1" who appears in 32.67% of the video), "12 observed people (preview)" (including "Observed person 001" who appears in 21.83% of the video), and "11 topics" (including "Fact checking", "Politics and government", "Barack obama", "Democratic party u s", "Donald trump politician business person", "Republican party u s", "The us government", "The white house", and "U s presidential election").

WP 2.2 – Scalable Crawling of Web content

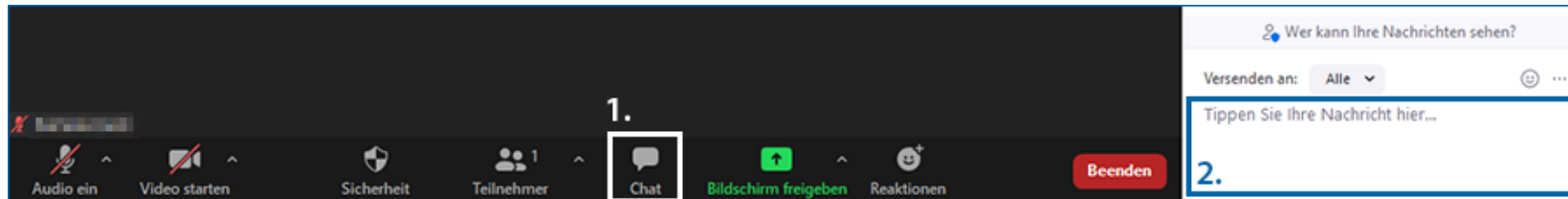
- **Main services:** Azure VMs, Azure Service Bus
- Scalable **extraction** of information on the web
- Dynamically **(re-)crawl** websites for information
- **Process** and **store information** at scale
 - e.g. using a data lake built upon Azure Data Lake Storage (ADLS) Generation 2



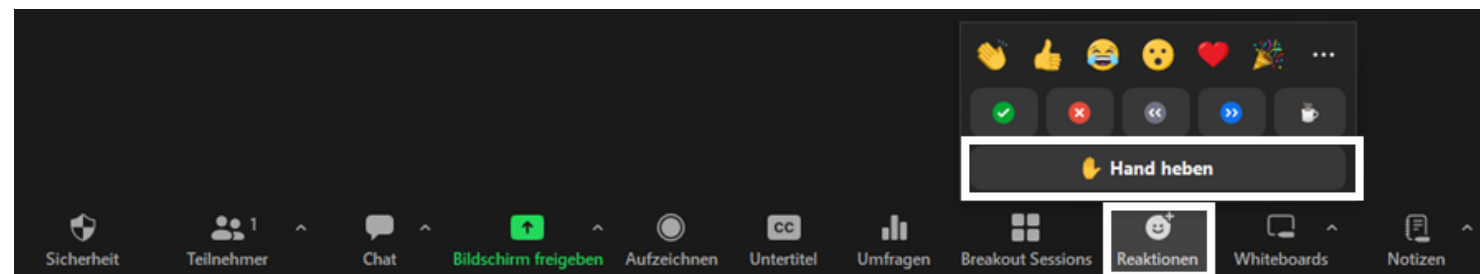
```
{  
  "@context": "https://schema.org",  
  "@type": "Person",  
  "givenName": "Bernie",  
  "familyName": "Sanders",  
  "jobTitle": "Politician",  
  "birthDate": "1941-09-08",  
  "age": "80"  
}
```

Questions about Using Azure Cloud Services in the FactCheck Project

- Please ask your questions as a chat comment.



- If you want to ask questions with microphone, please click the "Raise Hand" button.



© Image by storyset on Freepik

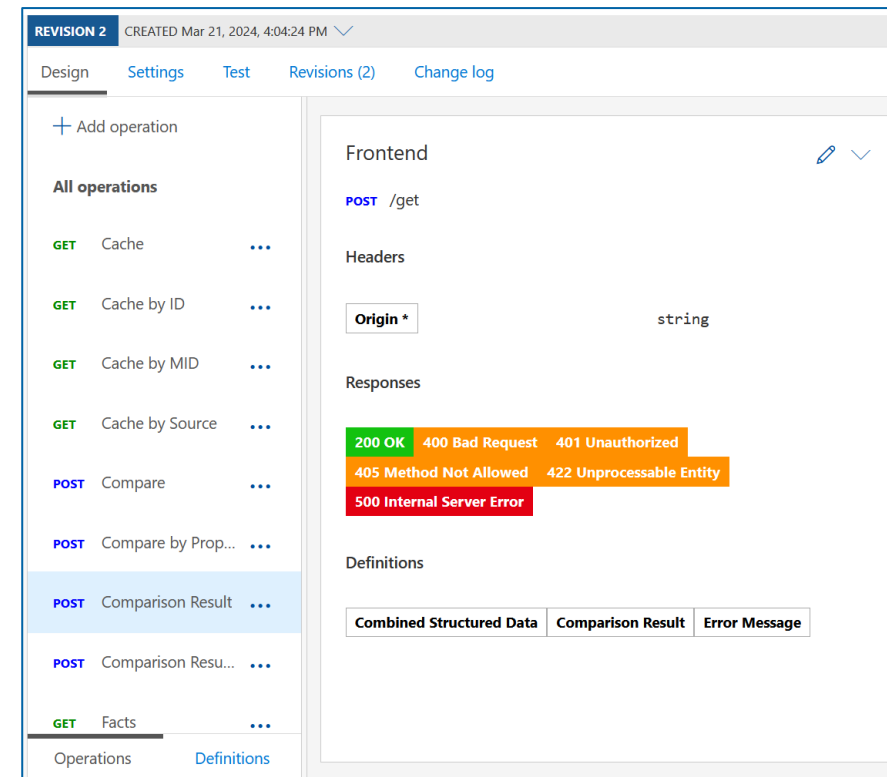
Q & A Session Materials

Additional information, scrapped slides, more material



WP 1.1 – Azure API Management for API Development

- **Main service:** Azure API Management (APIM)
- **Decouple** API definition and implementation
- **Hide** internal endpoints behind public URL
- **Cloud-based** API documentation and testing



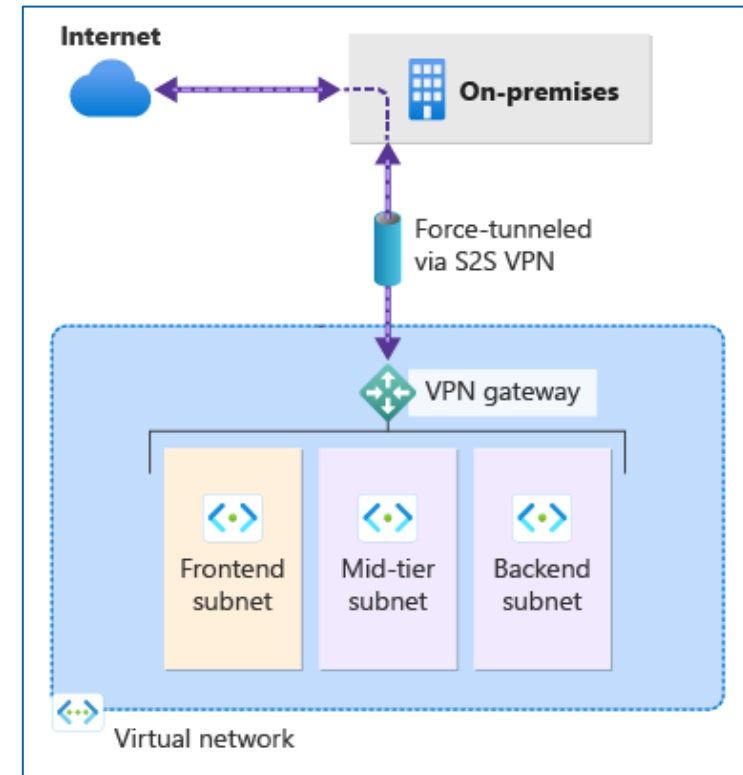
The screenshot displays the Azure API Management console interface for a specific API definition. At the top, it shows 'REVISION 2' created on 'Mar 21, 2024, 4:04:24 PM'. The navigation tabs include 'Design', 'Settings', 'Test', 'Revisions (2)', and 'Change log'. The left sidebar lists 'All operations' with a table of API methods and their names:

Method	Operation Name	More
GET	Cache	...
GET	Cache by ID	...
GET	Cache by MID	...
GET	Cache by Source	...
POST	Compare	...
POST	Compare by Prop...	...
POST	Comparison Result	...
POST	Comparison Resu...	...
GET	Facts	...

The main area shows the details for the 'Frontend' API definition. The method is 'POST' and the path is '/get'. Under 'Headers', there is a required header 'Origin *' of type 'string'. The 'Responses' section lists various HTTP status codes with their corresponding colors: 200 OK (green), 400 Bad Request (orange), 401 Unauthorized (orange), 405 Method Not Allowed (orange), 422 Unprocessable Entity (orange), and 500 Internal Server Error (red). The 'Definitions' section shows a table with columns for 'Combined Structured Data', 'Comparison Result', and 'Error Message'.

WP 1.2 – Connect On-Premises with Azure

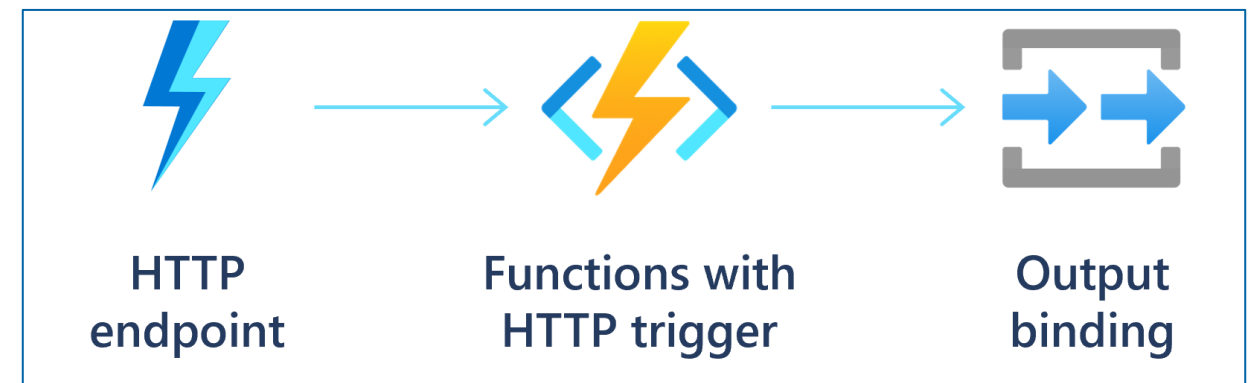
- **Main service:** Azure VPN Gateway
- Securely **connect** on-premises infrastructure with the cloud
- Uses IPSec IKE P2P (**industry standard**)
- Close **collaboration** of MIS and the ZID



<https://learn.microsoft.com/en-us/azure/vpn-gateway/about-site-to-site-tunneling>

WP 1.3 – Cloud-native reimplementation on Azure

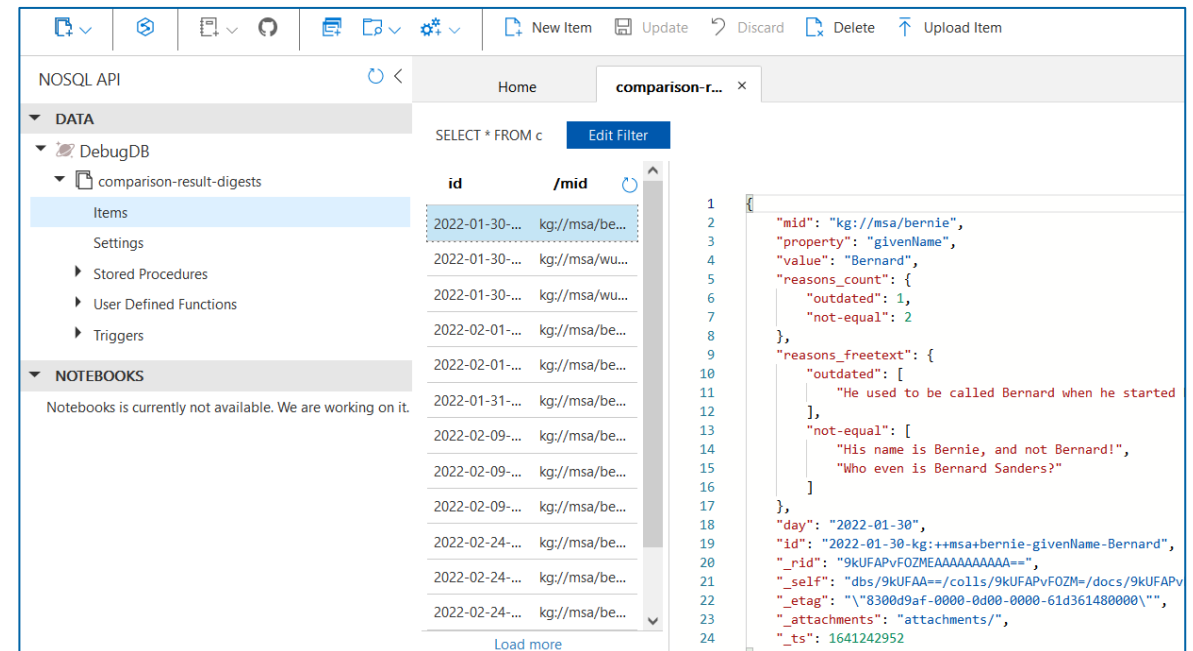
- **Main service:** Azure Functions
- Split up monolithic business logic, and (partially) reimplement it as **microservices**
- Eases independent **scaling** and **deployment**



<https://learn.microsoft.com/en-us/azure/azure-functions/functions-scenarios>

WP 1.4 – Data Store Migration to Azure CosmosDB

- **Main service:** Azure CosmosDB
- **Hosting** (non-sensitive) research data on Azure CosmosDB (multi-model document database)
- Advanced **indexing** and **querying** functionality
- **Distributed** database with high **availability**



The screenshot displays the Azure CosmosDB NOSQL API interface. On the left, a navigation pane shows the database structure under 'DATA', including 'DebugDB', 'comparison-result-digests', 'Items', 'Settings', 'Stored Procedures', 'User Defined Functions', and 'Triggers'. The 'Items' collection is selected, showing a table with columns 'id' and '/mid'. The table contains several rows of data, with the first row highlighted. On the right, a JSON document is displayed, showing a complex structure with nested arrays and objects, including fields like 'mid', 'property', 'value', 'reasons_count', 'reasons_freetext', 'day', 'id', '_rid', '_self', '_etag', '_attachments', and '_ts'.



ZID Services and AI

- Data Enrichment by AI: UNIDAM as an Example

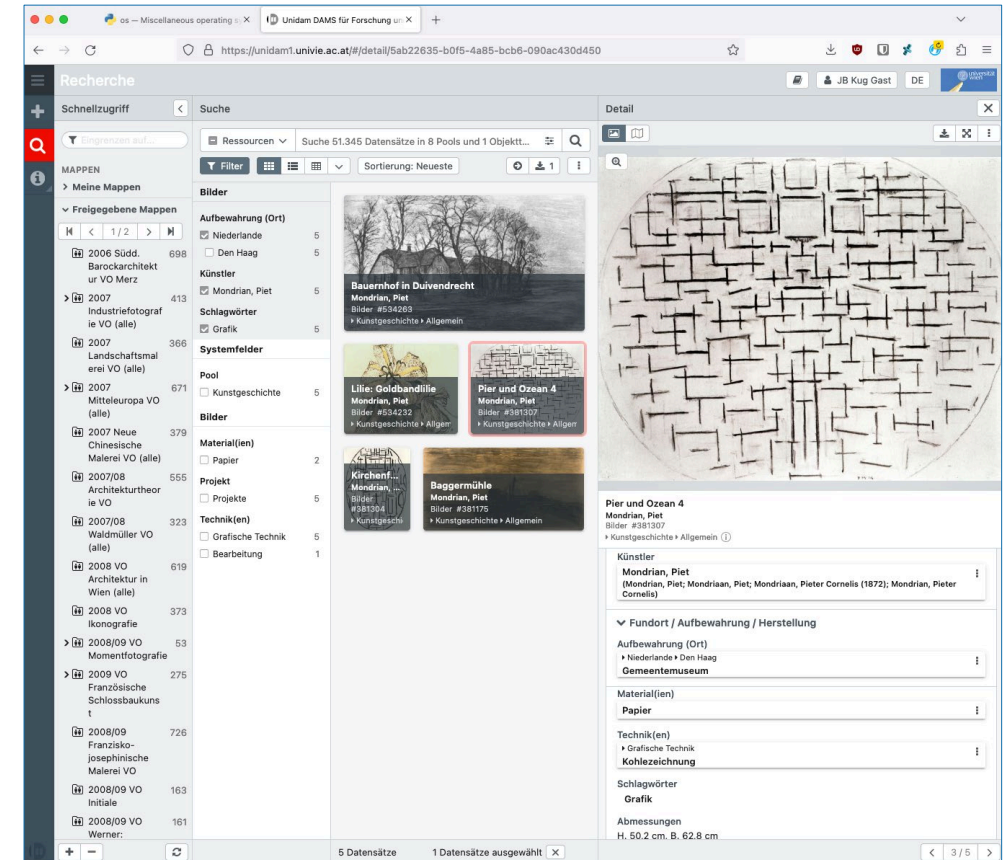


Data Enrichment by AI: UNIDAM as an Example

Presentation by János Békési

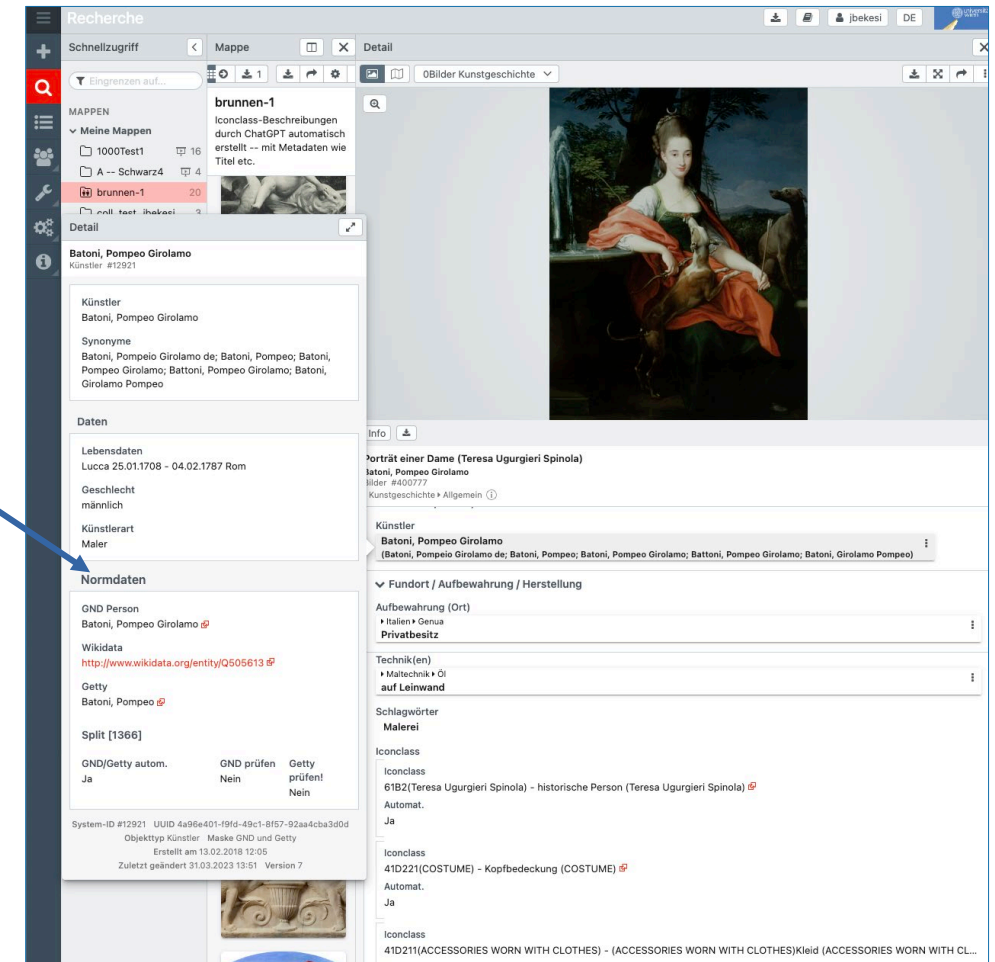
UNIDAM: Digital Asset Management System at the University of Vienna

- Mainly picture material for teaching and research purposes
- Closed user base (for copyright reasons)
- About 500,000 assets
- About 150 metadata fields (not used simultaneously)
- URL: unidam1.univie.ac.at



Metadata Enrichments already attempted

- **Named Entity Recognition (NER):** Artists' names in UNIDAM are supplemented with Virtual International Authority File (VIAF) and GND (Gemeinsame Normdatei) entries
- **Topic Models** (only for textual assets): not an enrichment as such but a research tool
- **Optical Character Recognition (OCR) / Handwritten Text Recognition (HTR)** result improvement (only for textual assets): via open source LLM – not yet feasible
- **Azure/OpenAI: ICONCLASS**



Recherche

Schnellzugriff

Mappe

Detail

Eingrenzen auf...

MAPPEN

Meine Mappen

1000Test1 16

A -- Schwarz4 4

brunnen-1 20

brunnen-1

Iconclass-Beschreibungen durch ChatGPT automatisch erstellt -- mit Metadaten wie Titel etc.

Detail

Batoni, Pompeo Girolamo

Künstler #12921

Künstler

Batoni, Pompeo Girolamo

Synonyme

Batoni, Pompeo Girolamo de; Batoni, Pompeo; Batoni, Pompeo Girolamo; Battoni, Pompeo Girolamo; Batoni, Girolamo Pompeo

Daten

Lebensdaten

Lucca 25.01.1708 - 04.02.1787 Rom

Geschlecht

männlich

Künstlerart

Maler

Normdaten

GND Person

Batoni, Pompeo Girolamo

Wikidata

<http://www.wikidata.org/entity/Q505613>

Getty

Batoni, Pompeo

Split [1366]

GND/Getty autom.	GND prüfen	Getty prüfent!
Ja	Nein	Nein

System-ID #12921 UUID 4a96e401-f9fd-49c1-8f57-92aa4c3a3d0d

Objektyp Künstler Maske GND und Getty

Erstellt am 13.02.2018 12:05

Zuletzt geändert 31.03.2023 13:51 Version 7

Portrait einer Dame (Teresa Ugurgieri Spinola)

Batoni, Pompeo Girolamo

Bilder #400777

Kunstgeschichte + Allgemein

Künstler

Batoni, Pompeo Girolamo

(Batoni, Pompeo Girolamo de; Batoni, Pompeo; Batoni, Pompeo Girolamo; Battoni, Pompeo Girolamo; Batoni, Girolamo Pompeo)

Fundort / Aufbewahrung / Herstellung

Aufbewahrung (Ort)

Italien + Genua

Privatbesitz

Technik(en)

Maltechnik + Öl

auf Leinwand

Schlagwörter

Malerei

Iconclass

Iconclass

61B2(Teresa Ugurgieri Spinola) - historische Person (Teresa Ugurgieri Spinola)

Automat.

Ja

Iconclass

41D221(COSTUME) - Kopfbedeckung (COSTUME)

Automat.

Ja

Iconclass

41D211(ACCESSORIES WORN WITH CLOTHES) - (ACCESSORIES WORN WITH CLOTHES)Kleid (ACCESSORIES WORN WITH CL...

UNIDAM detail view with artist normdata

ICONCLASS

- Is a "comprehensive classification system for the content of images" devised by Henry de Waal in the 1940s
- Has 10 main subdivisions (and then some)

Working example: WienMuseum
(Iconclass codes implemented manually)
sammlung.wienmuseum.at

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[ICONCLASS](#)
[Browse & Search](#)
[Documentation](#)
[News](#)

Browse **Search**

- 0 · Abstract, Non-representational Art
- ▶ 1 · Religion and Magic
- ▶ 2 · Nature
 - 20 · 'Natura' (allegorical figure or scene; or as Diana of Ephesus, with many breasts); 'Natura' (Ripa)
 - ▶ 21 · the four elements, and ether, the fifth element
 - ▶ 22 · natural phenomena
 - ▶ 23 · time
 - ▶ 24 · the heavens (celestial bodies)
 - ▶ 25 · earth, world as celestial body
 - ▶ 25A · maps, atlases
 - ▶ 25B · continents represented allegorically
 - ▶ 25C · geological phenomena
 - ▶ 25D · rock types; minerals and metals; soil types
 - ▶ 25E · geological-chronological division; historical geology; geological era
 - ▶ 25F · animals
 - ▶ 25F1 · groups of animals
 - ▶ 25F2 · mammals
 - ▶ 25F21 · groups of mammals
 - ▶ 25F22 · monkeys, apes
 - ▶ 25F23 · beasts of prey, predatory animals
 - ▶ 25F23(...) · beasts of prey, predatory animals (with NAME)
 - ▶ 25F23(BADGER) · beasts of prey, predatory animals: badger
 - ▶ 25F23(BEAR) · beasts of prey, predatory animals: bear
 - ▶ 25F23(CHEETAH) · beasts of prey, predatory animals: cheetah
 - ▶ 25F23(ERMINE) · beasts of prey, predatory animals: ermine
 - ▶ 25F23(FERRET) · beasts of prey, predatory animals: ferret
 - ▶ 25F23(FOX) · beasts of prey, predatory animals: fox
 - ▶ 25F23(HYENA) · beasts of prey, predatory animals: hyena
 - ▶ 25F23(ICHNEUMON) · beasts of prey, predatory animals: ichneumon
 - ▶ 25F23(LEOPARD) · beasts of prey, predatory animals: leopard
 - ▼ 25F23(LION) · beasts of prey, predatory animals: lion
 - 25FF23(LION) · beasts of prey, predatory animals: lion - FF - fabulous animals
 - ▶ 25F23(LYNX) · beasts of prey, predatory animals: lynx

2 · Nature

25 · earth, world as celestial body

25F · animals

25F2 · mammals

25F23 · beasts of prey, predatory animals

25F23(...) · beasts of prey, predatory animals (with NAME)

25F23(LION) · beasts of prey, predatory animals:

lion

Search with these related keywords:
animal, earth, lion, mammal, nature, predatory animal, world

Add more detail:

25FF23(LION) · beasts of prey, predatory animals: lion - FF - fabulous animals

25F23(LION)(+0) · beasts of prey, predatory animals: lion (+ variant)

25F23(LION)(+1) · beasts of prey, predatory animals: lion (+ animals used symbolically)

25F23(LION)(+2) · beasts of prey, predatory animals: lion (+ sex and age of animals; propagation of animals)

25F23(LION)(+3) · beasts of prey, predatory animals: lion (+ anatomy of animals)

25F23(LION)(+4) · beasts of prey, predatory animals: lion (+ animal behaviour)

25F23(LION)(+5) · beasts of prey, predatory animals: lion (+ animal(s) in motion; positions, expressions of animals)

25F23(LION)(+6) · beasts of prey, predatory animals: lion (+ disease and death of animal(s))

25F23(LION)(+7) · beasts of prey, predatory animals: lion (+ animals - biological investigation)

25F23(LION)(+8) · beasts of prey, predatory animals: lion (+ man and animal)

25F23(LION)(+9) · beasts of prey, predatory animals: lion (+ products of animals)

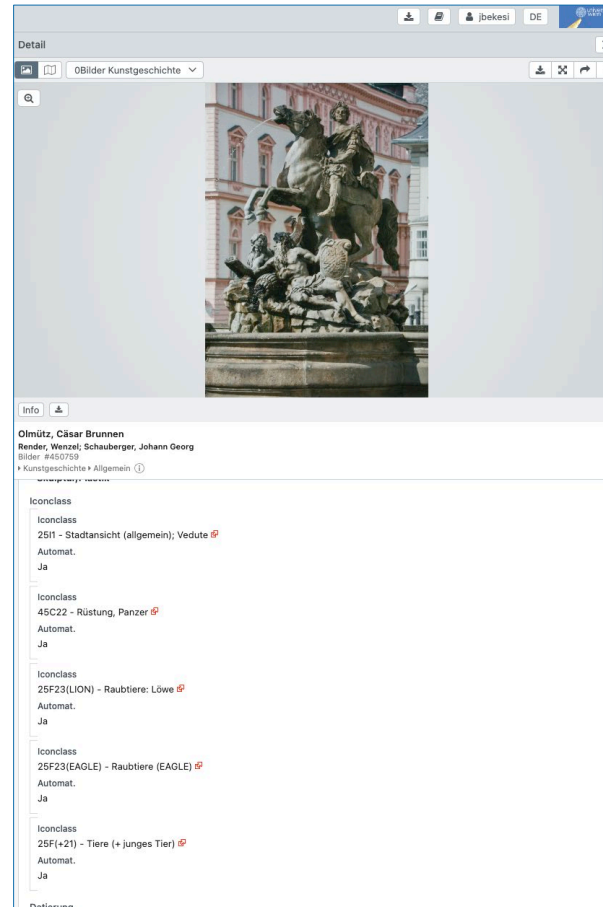
For more features, [you need to log in.](#)

ICONCLASS website with opened concept „LION“

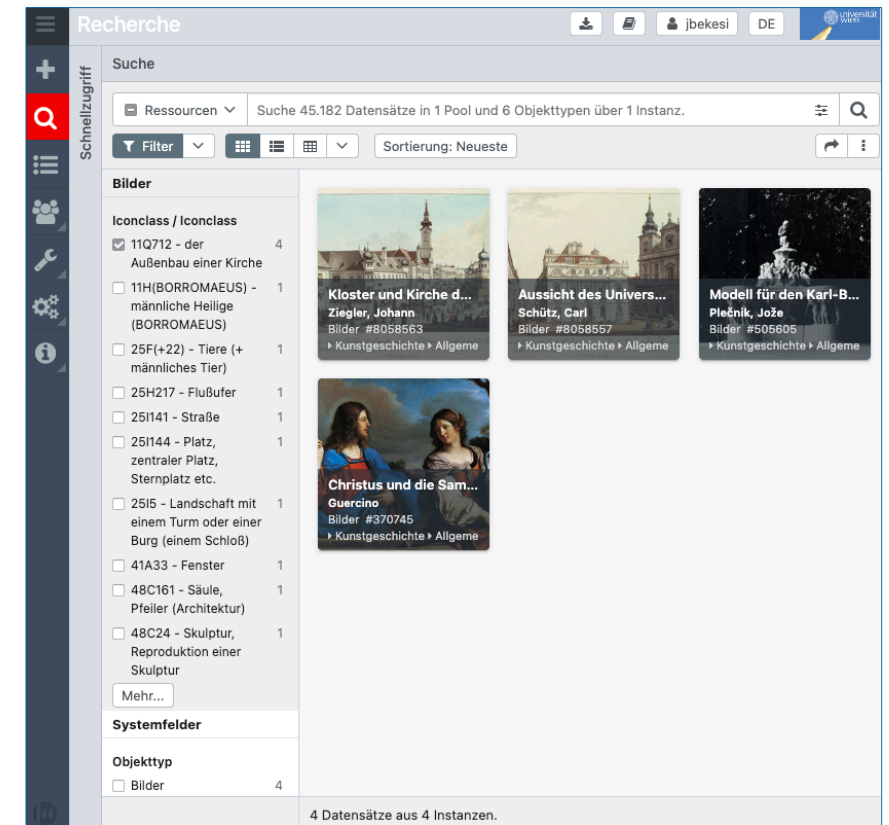
ICONCLASS (cont'd)

Iconclass codes can

- work as facets in a faceted search
- thereby collect assets related by their visual (iconographical) content



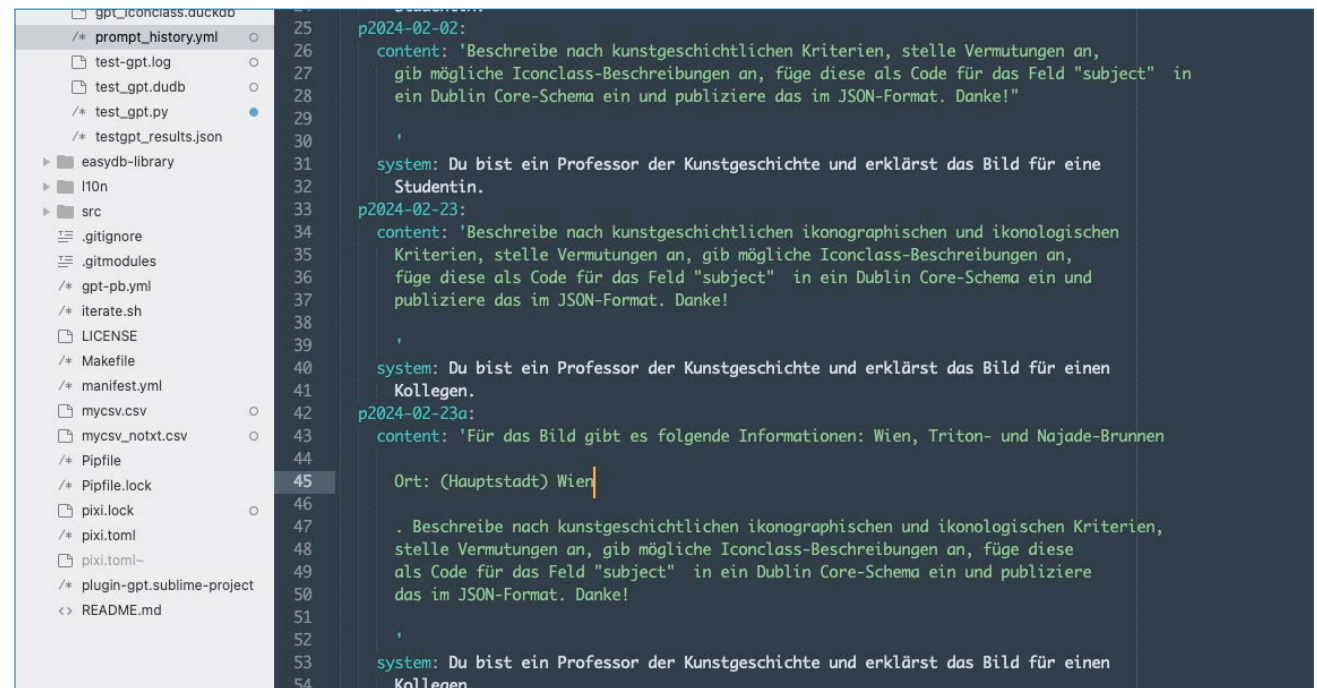
UNIDAM detail view with iconclass metadata



UNIDAM search view filtered by iconclass

OpenAI/Azure

- Prompts are being iterated to find a reasonable output for processing
- Cost/benefit has yet to be assessed
- After authentication etc. is in place, everything works smoothly
- Later on, the wealth of query metadata could be analysed



```
gpt_iconclass.duckdb 25
/* prompt_history.yml 26
test-gpt.log 27
test-gpt.dudb 28
/* test-gpt.py 29
/* testgpt_results.json 30
easydb-library 31
ll0n 32
src 33
.gitignore 34
.gitmodules 35
/* gpt-pb.yml 36
/* iterate.sh 37
LICENSE 38
/* Makefile 39
/* manifest.yml 40
/* mycsv.csv 41
mycsv_notxt.csv 42
/* Pipfile 43
/* Pipfile.lock 44
pixi.lock 45
/* pixi.toml 46
/* pixi.toml~ 47
/* pixi.toml~ 48
/* plugin-gpt.sublime-project 49
README.md 50
51
52
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```

```
p2024-02-02:
content: 'Beschreibe nach kunstgeschichtlichen Kriterien, stelle Vermutungen an, gib mögliche Iconclass-Beschreibungen an, füge diese als Code für das Feld "subject" in ein Dublin Core-Schema ein und publiziere das im JSON-Format. Danke!'

system: Du bist ein Professor der Kunstgeschichte und erklärst das Bild für eine Studentin.
p2024-02-23:
content: 'Beschreibe nach kunstgeschichtlichen ikonographischen und ikonologischen Kriterien, stelle Vermutungen an, gib mögliche Iconclass-Beschreibungen an, füge diese als Code für das Feld "subject" in ein Dublin Core-Schema ein und publiziere das im JSON-Format. Danke!'

system: Du bist ein Professor der Kunstgeschichte und erklärst das Bild für einen Kollegen.
p2024-02-23a:
content: 'Für das Bild gibt es folgende Informationen: Wien, Triton- und Najade-Brunnen

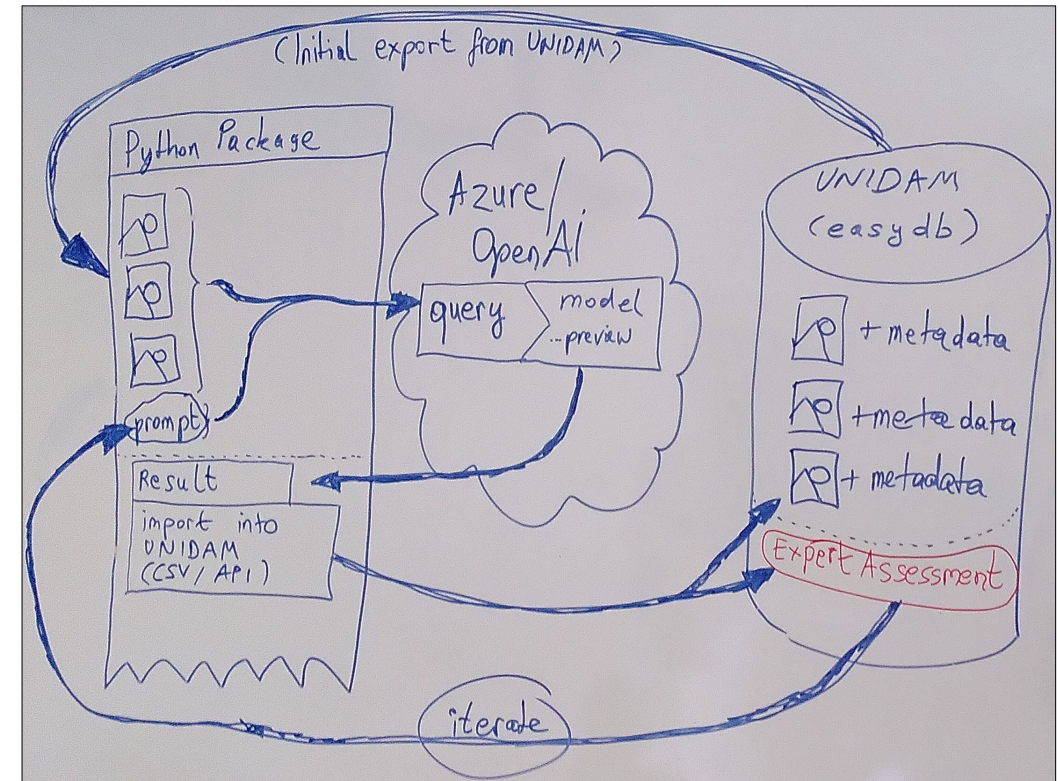
Ort: (Hauptstadt) Wien

. Beschreibe nach kunstgeschichtlichen ikonographischen und ikonologischen Kriterien, stelle Vermutungen an, gib mögliche Iconclass-Beschreibungen an, füge diese als Code für das Feld "subject" in ein Dublin Core-Schema ein und publiziere das im JSON-Format. Danke!'

system: Du bist ein Professor der Kunstgeschichte und erklärst das Bild für einen Kollegen.
```

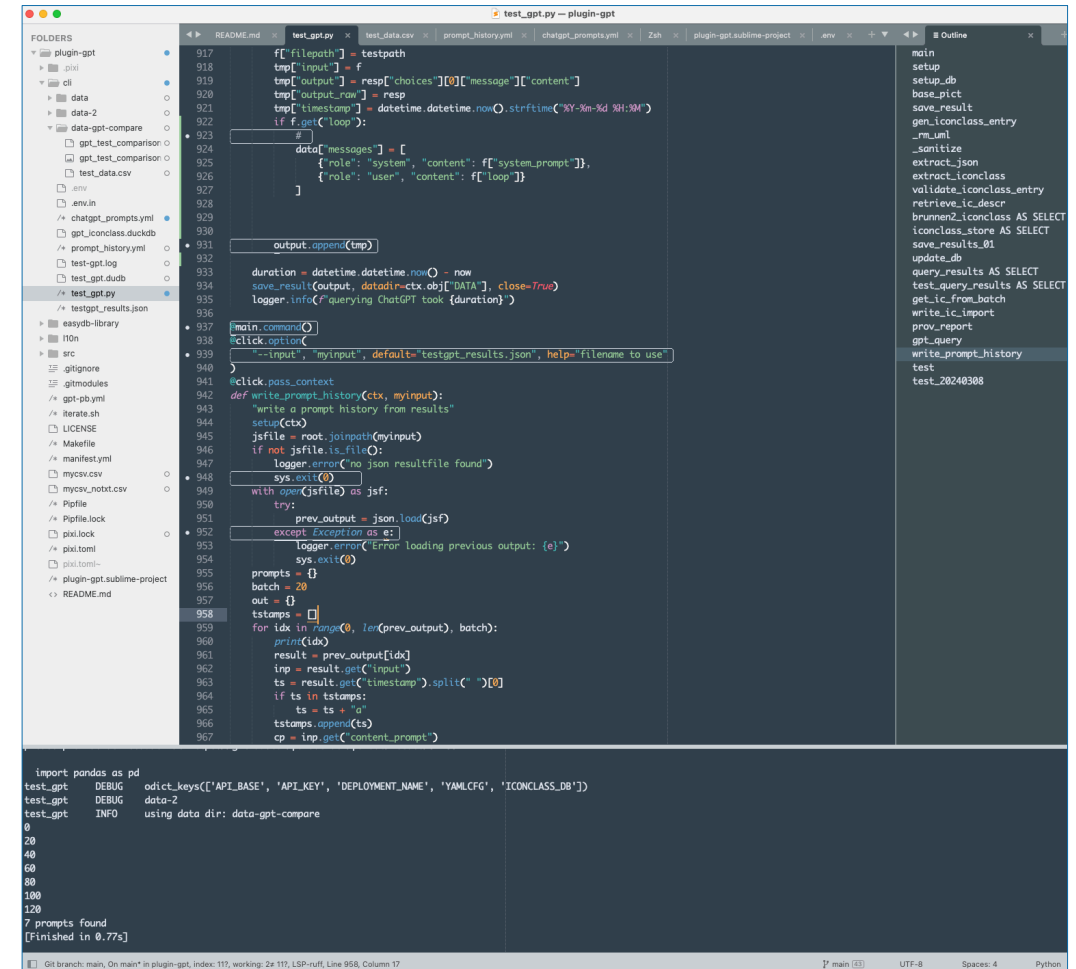
Our Workflow (Prototype)

1. Export data (pictures and some metadata) from UNIDAM
2. Use prompt to query Azure/OpenAI model with data
3. Clean result and write import file for UNIDAM
4. Import result into UNIDAM
5. Take expert assessment into account and
6. Iterate 2-5 until satisfied



Our Workflow (cont'd)

- Prompts are being evaluated after each run
- Prompts from the OpenAI Web GUI are being evaluated as well, often used as a starting point
- A multi-step prompt will be attempted to let OpenAI auto-correct the results
- Results (ICONCLASS codes) are checked for validity (to avoid hallucinations)






```

917 f["filepath"] = testpath
918 tmp["input"] = f
919 tmp["output"] = resp["choices"][0]["message"]["content"]
920 tmp["output_row"] = resp
921 tmp["timestamp"] = datetime.datetime.now().strftime("%Y-%m-%d %H:%M")
922 if f.get("loop"):
923     #
924     data["messages"] = [
925         {"role": "system", "content": f["system_prompt"]},
926         {"role": "user", "content": f["loop"]}
927     ]
928
929     output.append(tmp)
930
931 duration = datetime.datetime.now() - now
932 save_result(output, data, ctx.obj["DATA"], close=True)
933 logger.info(f"querying ChatGPT took {duration}")
934
935
936
937 @click.option(
938     "--input", "myinput", default="testgpt_results.json", help="filename to use"
939 )
940 @click.pass_context
941 def write_prompt_history(ctx, myinput):
942     """write a prompt history from results"""
943     setup(ctx)
944     jsfile = root.joinpath(myinput)
945     if not jsfile.is_file():
946         logger.error("no json resultfile found")
947     sys.exit(0)
948     with open(jsfile) as jsf:
949         try:
950             prev_output = json.load(jsf)
951         except Exception as e:
952             logger.error("Error loading previous output: {e}")
953             sys.exit(0)
954     prompts = {}
955     batch = 20
956     out = {}
957     tstamps = []
958     for idx in range(0, len(prev_output), batch):
959         print(idx)
960         result = prev_output[idx]
961         inp = result.get("input")
962         ts = result.get("timestamp").split(" ")[0]
963         if ts in tstamps:
964             ts = ts + "a"
965         tstamps.append(ts)
966         cp = inp.get("content_prompt")
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Future perspectives

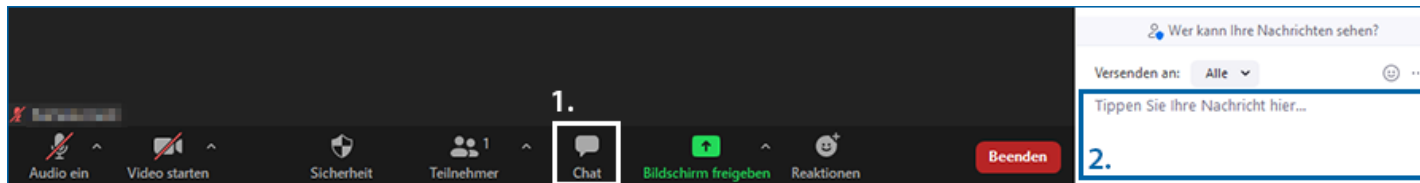
- Obtain half-automated workflow for enrichment
- Implement quality control for results of enrichment runs
- Widen the scope of possible enrichment targets in UNIDAM
- Reduce cost per request (i.e. number of tokens used) by smart prompting or other measures
- Evaluate cost/benefit

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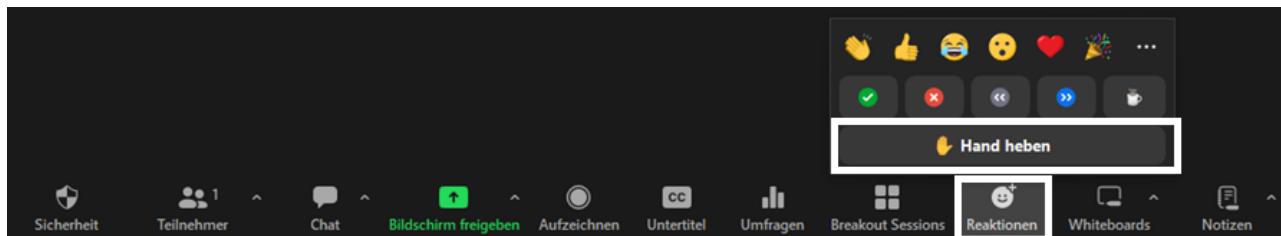
UNIDAM: toggle switch for later checks

Questions about Data Enrichment by AI: UNIDAM as an Example

- Please ask your questions as a chat comment.



- If you want to ask questions with microphone, please click the "Raise Hand" button.



If you have any further questions, please contact us at: unidam@univie.ac.at

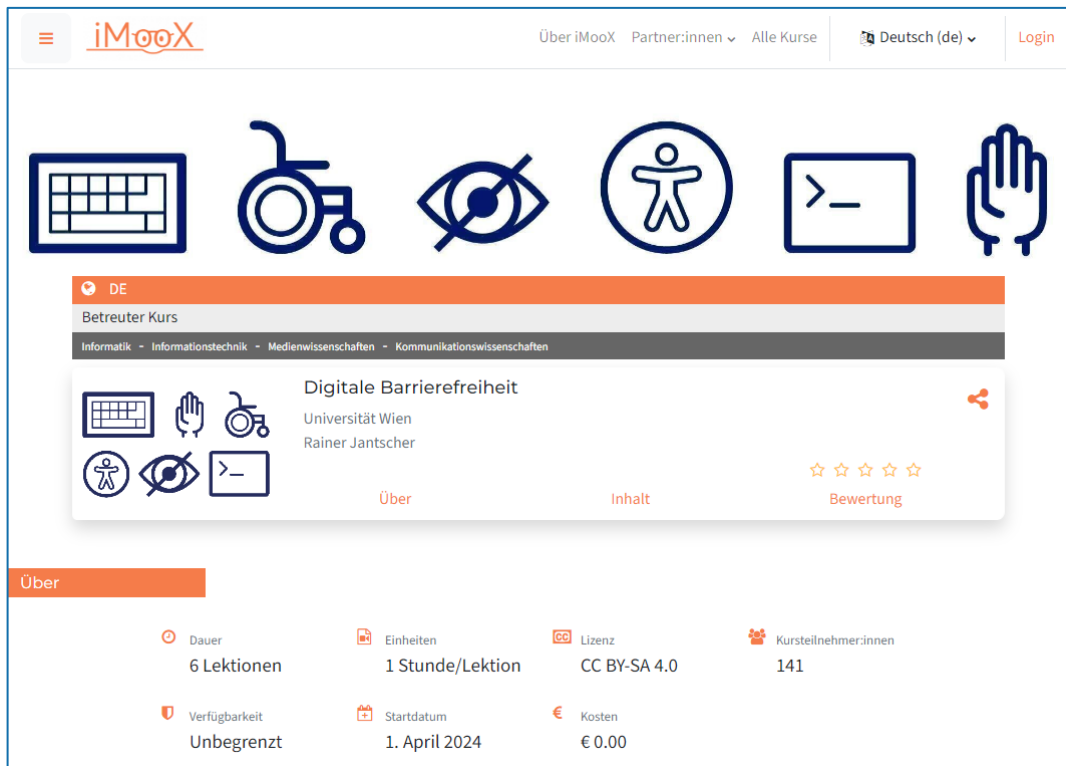
© Image by storyset on Freepik



News and Feedback

Michaela Bociurko

Free online course about digital accessibility



The screenshot shows the iMooX course page for 'Digitale Barrierefreiheit'. The page features a navigation bar with the iMooX logo, a language dropdown set to 'Deutsch (de)', and a 'Login' button. Below the navigation bar is a row of six icons representing different types of accessibility: a keyboard, a wheelchair, an eye, a person in a circle, a terminal window, and a hand. The course title 'Digitale Barrierefreiheit' is prominently displayed, along with the instructor's name 'Rainer Jantscher' and the university 'Universität Wien'. A star rating of five stars is visible. Below the course title, there are three tabs: 'Über', 'Inhalt', and 'Bewertung'. The 'Über' tab is currently selected, showing course details such as duration (6 lessons), units (1 hour/lesson), license (CC BY-SA 4.0), and cost (€ 0.00).

Über			
Dauer	Einheiten	Lizenz	Kursteilnehmer:innen
6 Lektionen	1 Stunde/Lektion	CC BY-SA 4.0	141
Verfügbarkeit	Startdatum	Kosten	
Unbegrenzt	1. April 2024	€ 0.00	



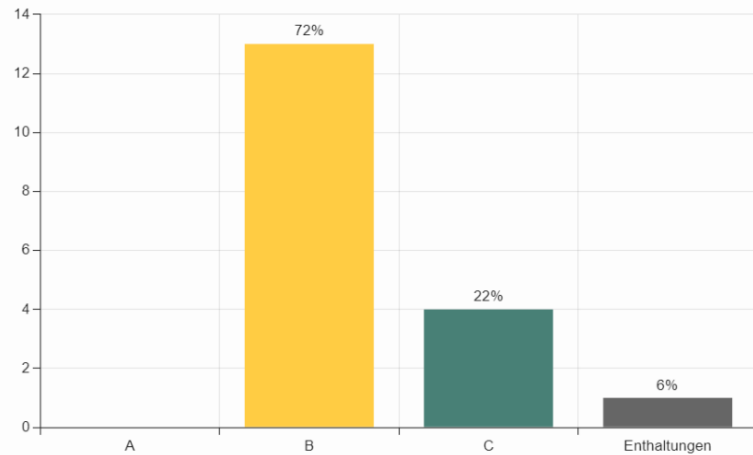
Find out more at: imoox.at/course/diba

We asked for your feedback

18 Antworten

% 

How long should the IT for Science Forum be?



A Longer than 2 hours, providing more time for discussion

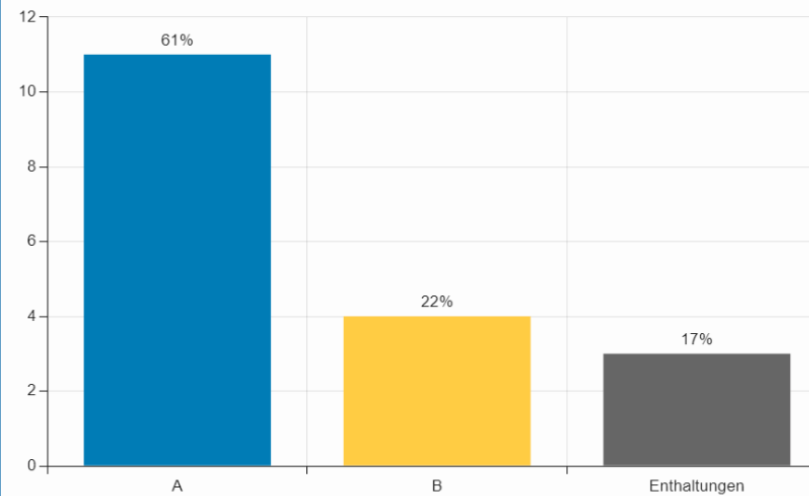
B 2 hours like now

C 1 hour, e.g. for a short input and quick discussion

18 Antworten

% 

What language should the IT for Science Forum be held in?



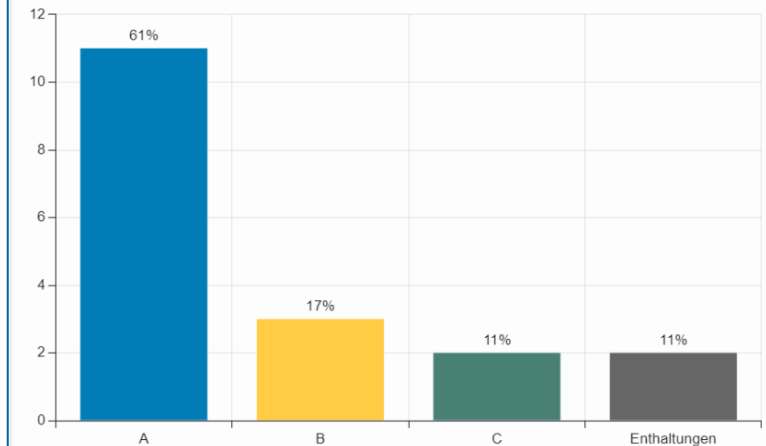
A In English

B In German

18 Antworten

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How often should the IT for Science Forum take place?



A Twice a year.

B More often, e.g. 4 times a year.

C Once a year.

Topics you want to hear about

16 Antworten



Which topics should be covered in upcoming sessions of the IT for Science Forum?

History

Register Data (AMDC) <https://rdm.univie.ac.at/services/austrian-micro-data-center/> maybe first reports on applications? AI and Data (Who owns the data?) IP and Data How do we deal with data being used by large language models without the consent of researchers and affected?

It was great that today's forum was dedicated to digital humanities and I hope to see more about this field of research in the future.

Big data sharing; dealing with sensitive data, i.e. very selective sharing of securely archived material

KI

FAIR data

Perhaps a bit more on working with data sheets and storing those in a collaborative environment. Best practice examples ... etc But so far the inputs were very interesting!

Unicorns in space

Enthaltungen

x 6

Thank you!

14 Antworten



General feedback on the IT for Science Forum (optional)?

Very informativ

Thank you! It was very interesting so far :)

Very nice

Perfect.

The forum is a great initiative to help connect not only different fields of research but especially - as it's title states - IT and science(/humanities). I'd explicitly like to acknowledge the great support beforehand, which really facilitated my preparation. Regarding language: Obviously, English is practical as an universal language, but maybe the forum language could be decided from event to event, depending on the speakers, thereby allowing conversation to flow a little more freely.

I've attended all events so far and really like the scope of topics. General organization and time management are always excellent and highly appreciated!

Good initiative! Keep up the good work.

Great.

thank you very much. It is great to have cases and examples from research!

Enthaltungen

x 4



Outlook

Ronald Maier

Thank you for your attention!
See you at the next IT for Science Forum:
30 October 2024, 9:00–11:00

Contact us: it4s@univie.ac.at
