Sentiment Analysis for Mental Health

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SAMH

Semantic Web

"The Semantic Web is about two things. It is about common formats for integration and combination of data drawn from diverse sources, where on the original Web mainly concentrated on the interchange of documents. It is also about language for recording how the data relates to real world objects."

http://www.w3.org/2001/sw/

SAMH ‹-› Semantic Web

Allow data from SAMH to be shared and reused across applications. Its structure can now be processed by other machines.

Conceptual Domain Model
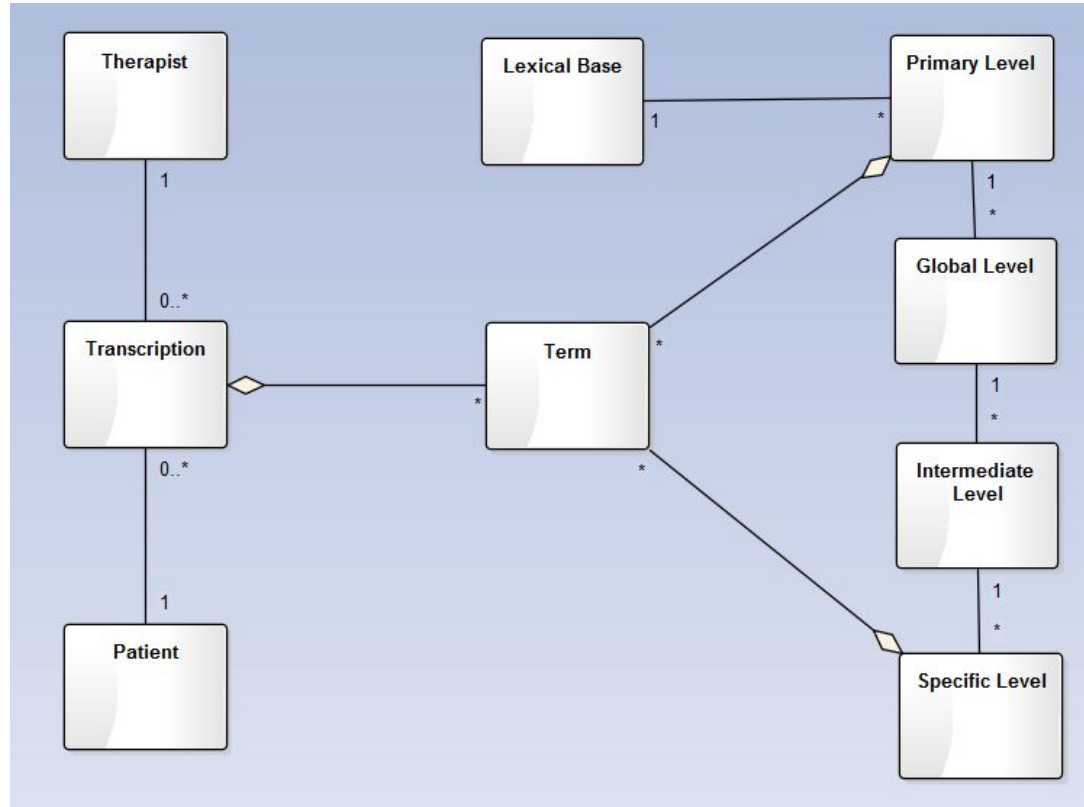
Methodology

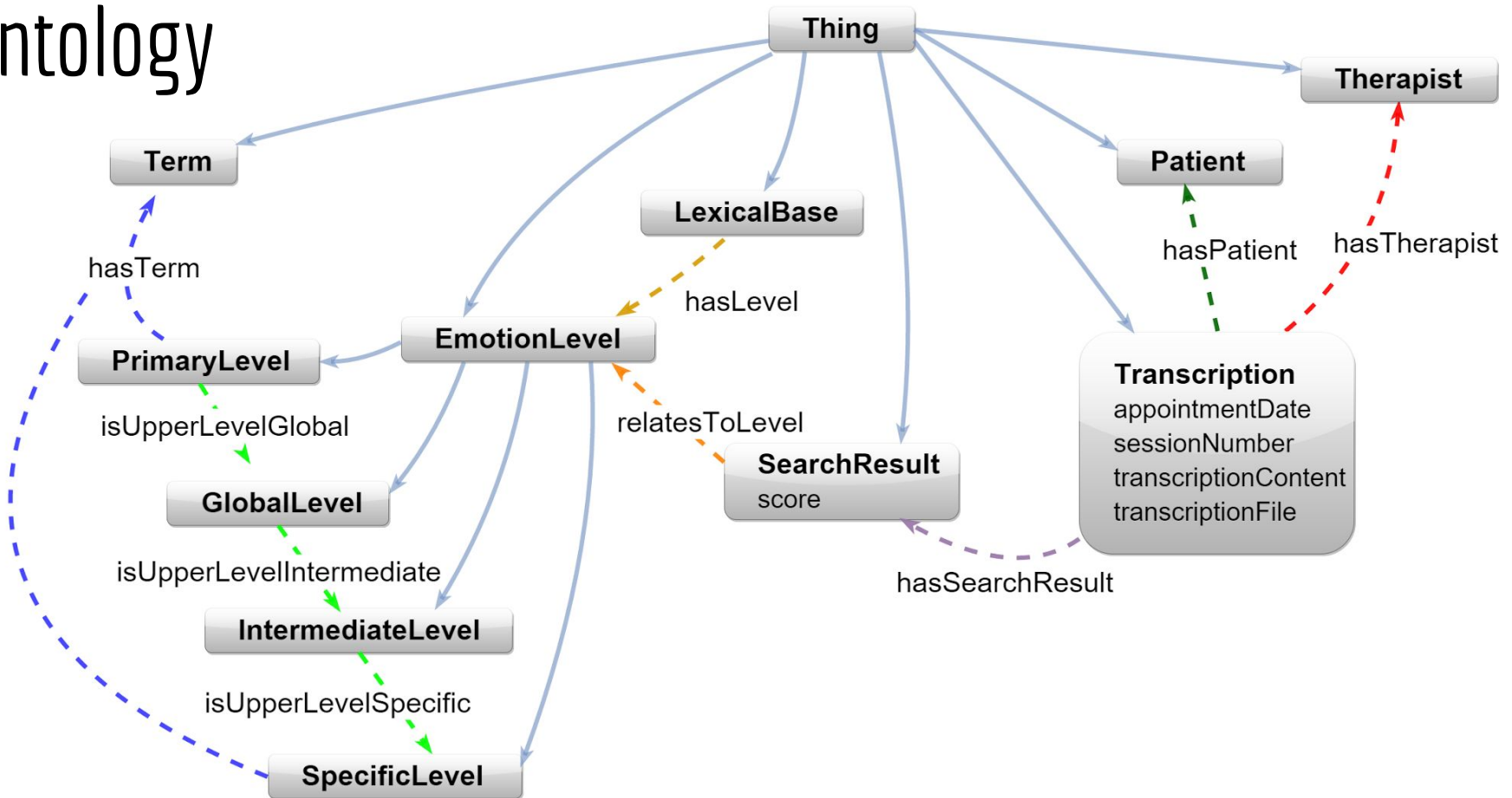Create an **ontology** for SAMH domain.

Populate with the current **data**.

Provide some data **query** examples.

Ontology

Ontology decision - Emotion Levels
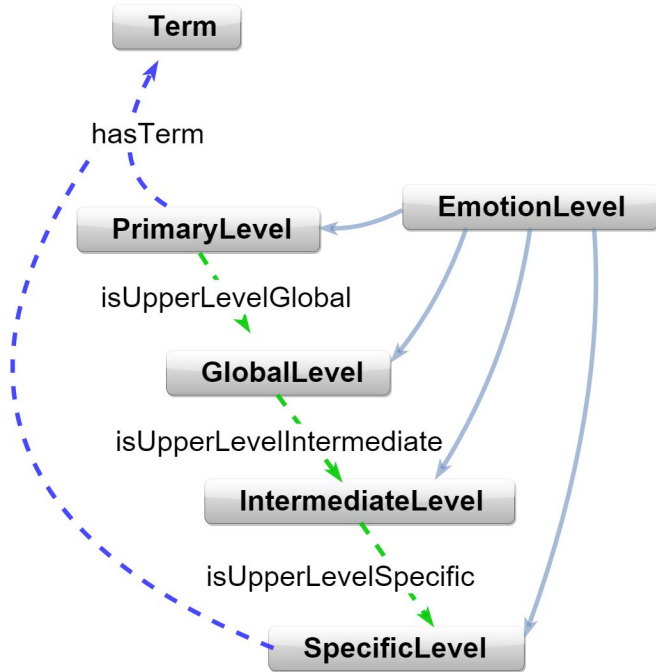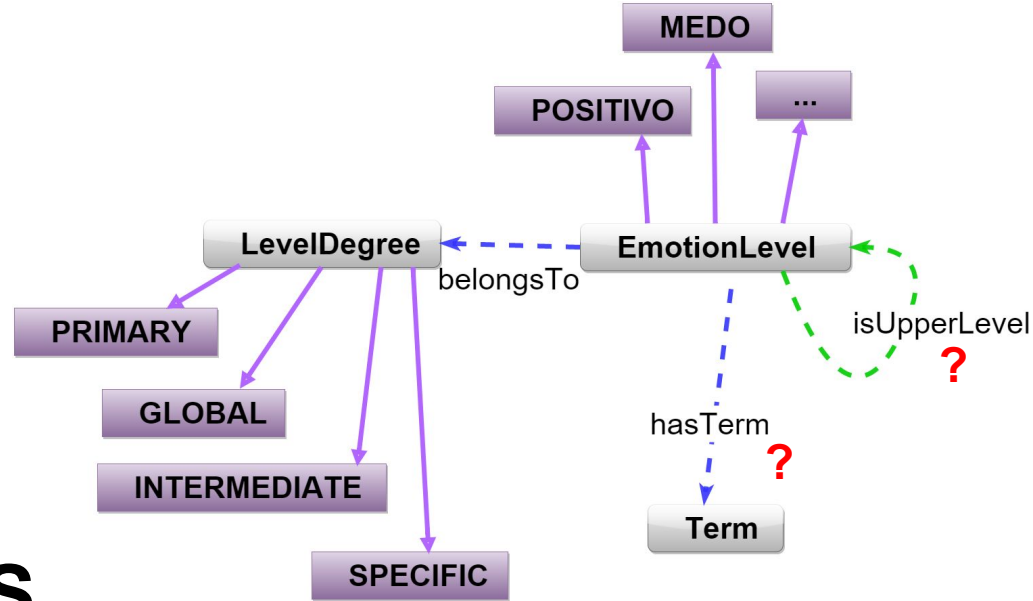
Ontology decision - Transcription Content
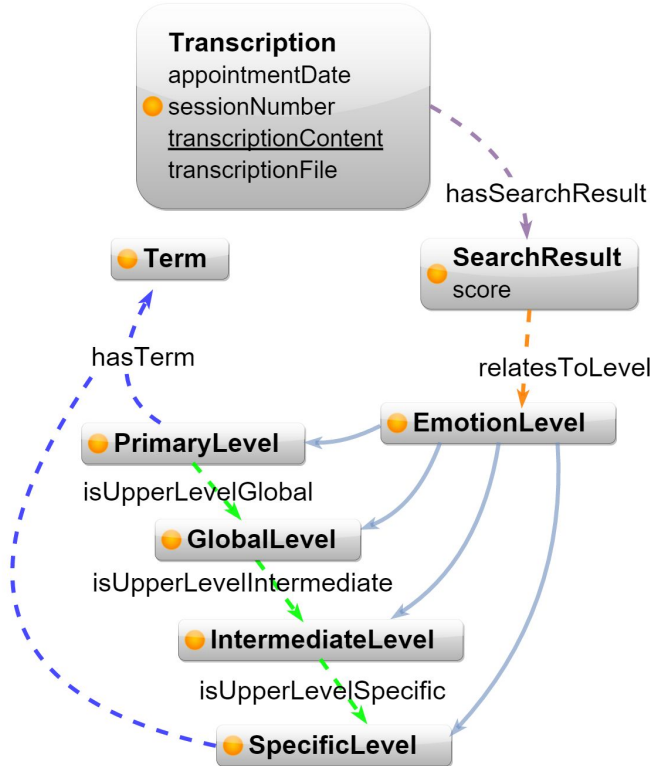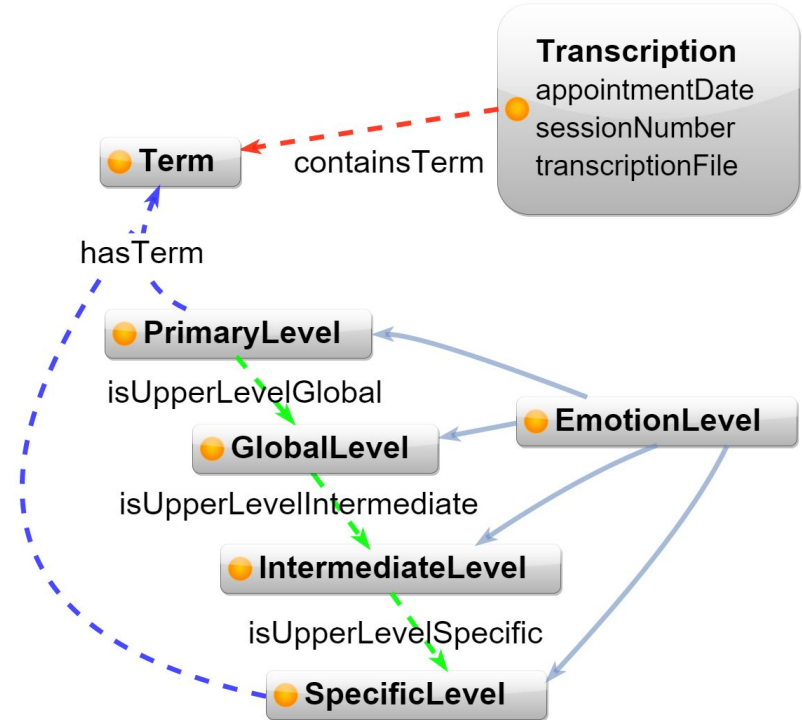
Ontology decision – Emotional Connection

Transcription
appointmentDate
sessionNumber
transcriptionContent
transcriptionFile

hasSearchResult

SearchResult
score

relatesToLevel

EmotionLevel

VS

Transcription
appointmentDate
sessionNumber
transcriptionContent
transcriptionFile

isRelevantIn

EmotionLevel
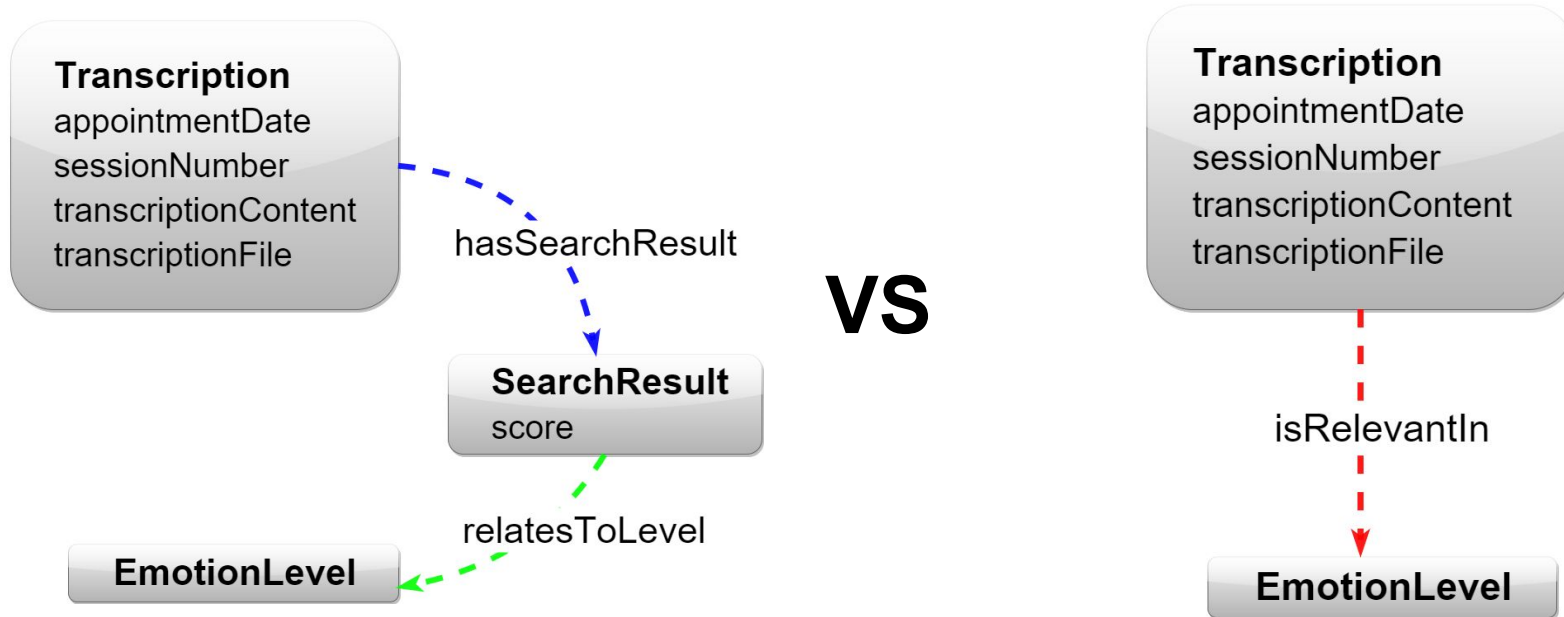
Populating the ontology

Tool - OWL API (http://owlapi.sourceforge.net/)

Pipeline - 4 Java modules:

- Lexical base
- Therapists, patients and transcriptions
- Transcriptions content (Solr)
- Search results (Solr)

Result: 14.2 MB file (OWL Functional Syntax)

Example Ontology Queries

- Return patients attended by a given therapist
- Return related emotion levels given a term
- Return terms of given emotion level
- Return best transcription for a given emotion level
- Return emotions for a given transcription
- Return emotions for a given patient
- ...

Patients of a therapist

```sparql
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX samh: <http://www.semanticweb.org/SAMH/ontologies/>

SELECT DISTINCT (?p as ?Patient)
WHERE {
    ?t a samh:Transcription .
    ?t samh:hasPatient ?p .
    ?t samh:hasTherapist ?therapist
    filter( regex(str(?therapist), "Salgado"))
}
ORDER BY ?Patient
```

Patient
P213
P465

Terms of an emotion level

```
SELECT DISTINCT (?t as ?terms)
WHERE {
    {
        ?eLevel samh:hasTerm ?t
    }
    UNION
    {
        ?eLevel samh:isUpperLevelSpecific ?spLevel .
        ?spLevel samh:hasTerm ?t
    }
    UNION
    {
        ?eLevel samh:isUpperLevelIntermediate ?intLevel .
        ?intLevel samh:isUpperLevelSpecific ?spLevel .
        ?spLevel samh:hasTerm ?t
    }
    UNION
    {
        ?eLevel samh:isUpperLevelGlobal ?gLevel .
        ?gLevel samh:isUpperLevelIntermediate ?intLevel .
        ?intLevel samh:isUpperLevelSpecific ?spLevel .
        ?spLevel samh:hasTerm ?t
    }
    filter( regex(str(?eLevel), "AMOR" ))
}
ORDER BY ?t
```
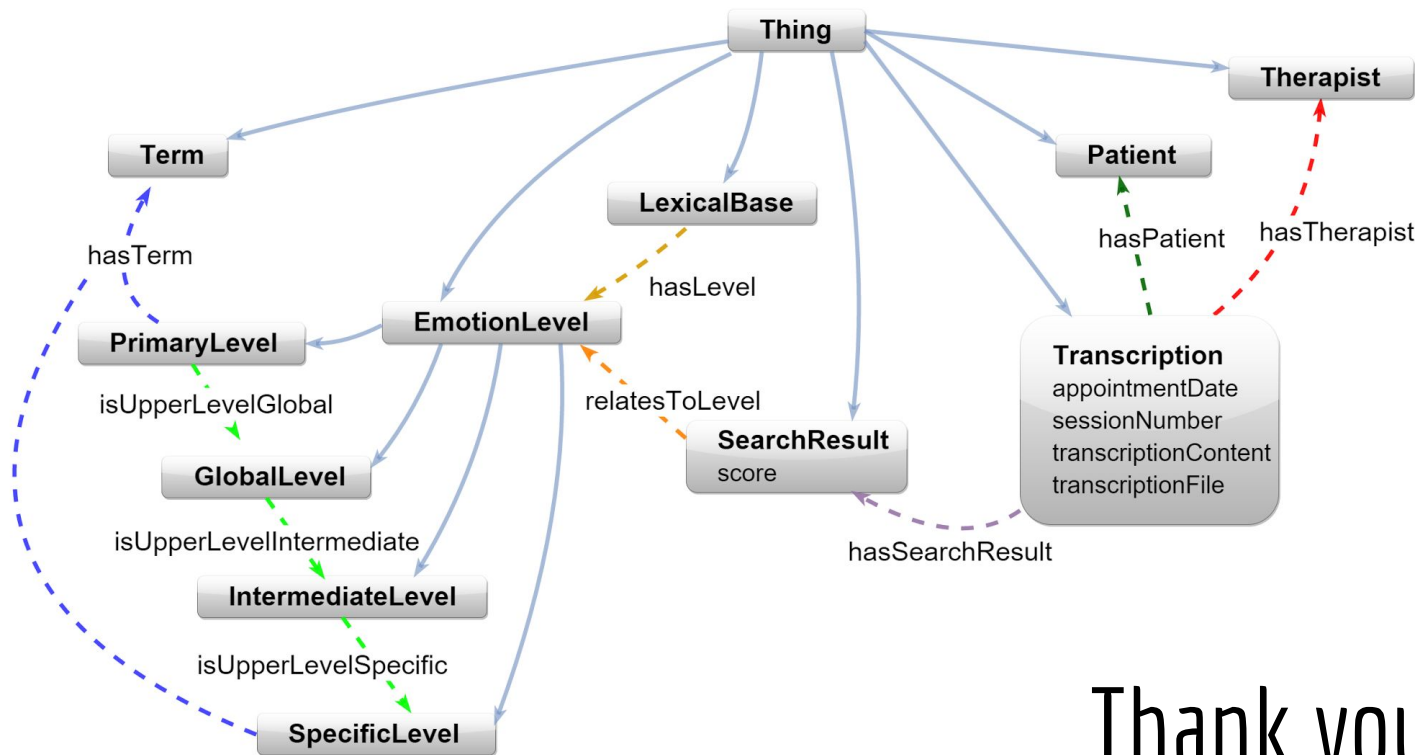
terms
abraçar
abraço
adorada
adorado
adorar
adoração
adorável
afectividade
afectivo
afecto
afectuosa
afectuosamente
afectuosidade

Emotions of a patient

```sparql
SELECT DISTINCT (?l as ?EmotionLevel) (SUM(?score) as ?sum)
WHERE
{
    {
        SELECT DISTINCT ?t ?p
        WHERE
        {
            ?t a samh:Transcription .
            ?t samh:hasPatient ?p .
            filter( regex(str(?p), "P003" ))
        }
    }

    ?sr rdf:type samh:SearchResult .
    ?sr samh:relatesToLevel ?l .
    ?t samh:hasSearchResult ?sr .
    ?sr samh:score ?score .
}
GROUP BY ?l
ORDER BY DESC(?sum)
```

EmotionLevel	sum
SAÚDE_MENTAL	"0.130470698"
AMOR	"0.1041389571999999"
AFEIÇÃO	"0.0516150628500000"
POSITIVA	"0.0466776511"
BENEVOLÊNCIA	"0.04183901726"
DESAGRADO	"0.0288823001650000"
SACIEDADE	"0.0275107727"
BEM_ESTAR	"0.02704925527"
EMOÇÕES_NÃO_ESPECI	"0.0235295852599999"
NEGATIVA	"0.02258522952"
ATRACÇÃO	"0.0221962878270000"
SATISFAÇÃO	"0.02191173791"
LUCIDEZ	"0.02105621720"

Thank you.