Access Programming Interface

Euretos Knowledge Platform

Agenda Euretos Knowledge Platform API

Ξ Data model

Ξ Concept search

Ξ Knowledge network

Ξ API usage

- request and response model
- enumeration
- concept search
- concept to concept
- concept to semantics
- direct connected
- direct connect semantic types
- direct connect with scores
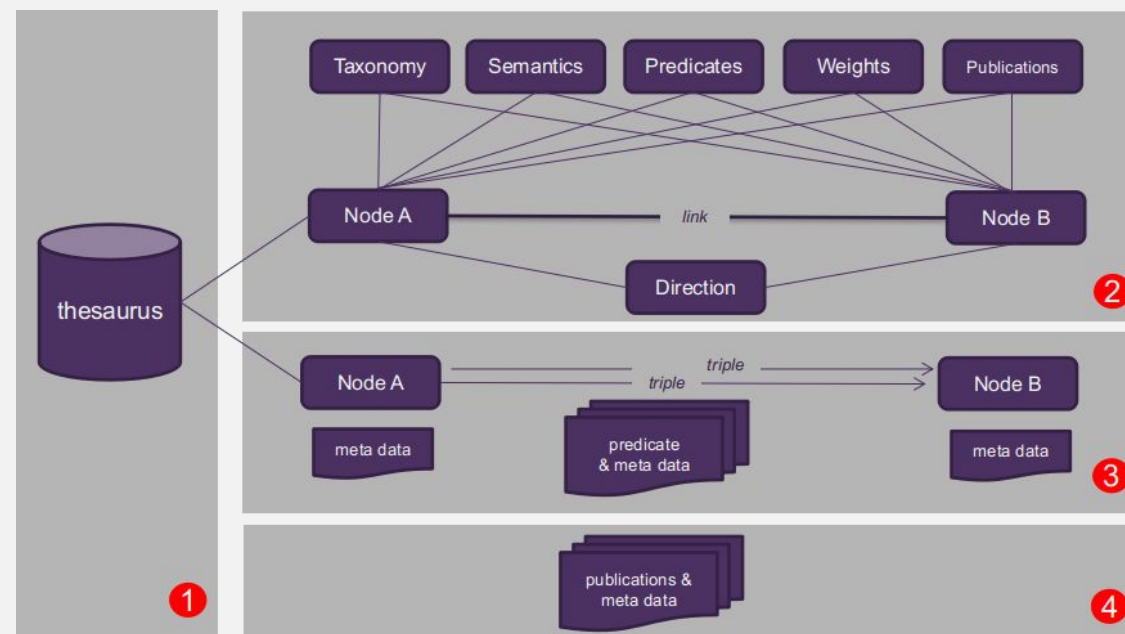- path info
- concepts, triples and publications by id

EURƎTOS

Data model overview

- Ξ Thesaurus is starting hub
  - ⊢ 6M unique concepts with 31M synonyms
  - ⊢ contains floating and connected concepts
- Ξ Matrix repository contains "lightweight" data
- Ξ Concept, Triple, Publication repositories contain the "heavy data"
  - ⊢ 350Gbyte, 6M concepts, 60M triples, 50M publications, 2.2M chemical pictures

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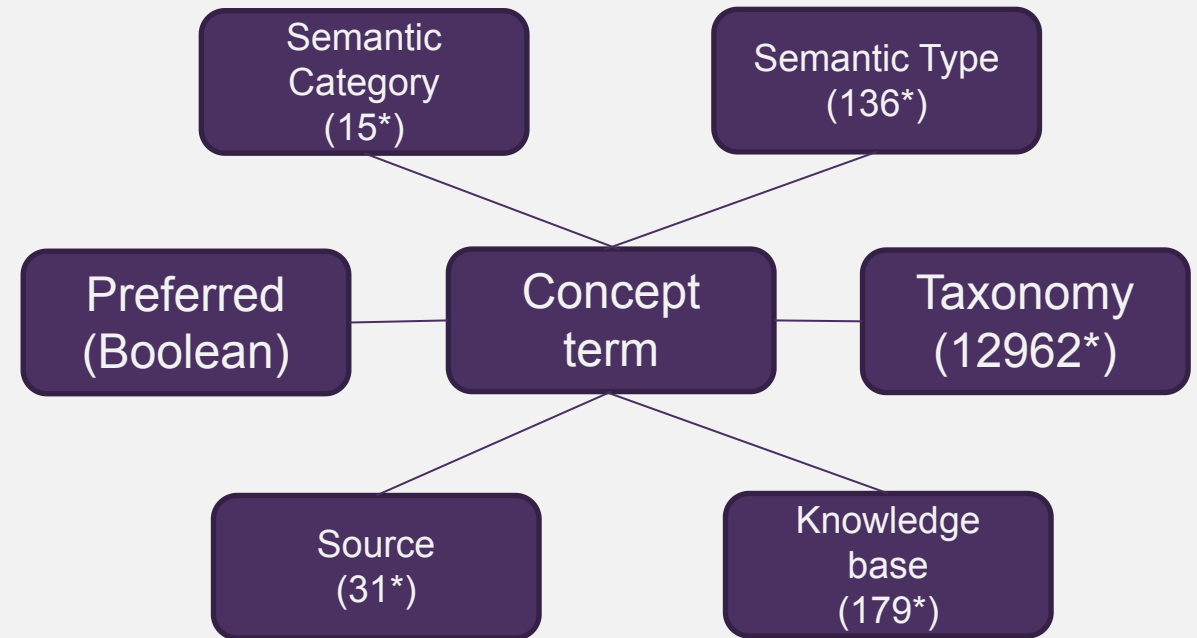
EURETOS

Concept search

- Concept term
  - Preferred term
  - Synonyms
- Concept characteristics
  - Semantic category
  - Semantic type
  - Taxonomy
- Source provenance
  - Source
  - Knowledgebase

Semantic Category (15*)

Semantic Type (136*)

Preferred (Boolean)

Concept term

Taxonomy (12962*)

Source (31*)

Knowledge base (179*)

*Feb 2016

How did we arrive at preferred term

1. ascomycete phenotype ontology
2. hmdb
3. entrezGene
4. uniprot
5. conceptWiki
6. umls
7. go
8. chembl
9. Tair Plant Ontology
10. enzymeDb
11. environment Ontology
12. trait Ontology
13. differential Expression Atlas
14. phytozome
15. pantherDBV
16. Human Phenotype Ontology
17. pathway Ontology

top down match (sources) is used for preferred term selection

How did we deal with numerical references

- [pdq].....
- [lnc].....
- [chebi].....
- [hgnc].....
- [phytozome].....
- [msh].....
- [hl7].....
- [pubchem].....
- [mth].....
- [animalqtldb].....
- [icd9].....
- [hprd].....
- [taxonomy].....
- [snomed].....
- [nci].....
- [rcd].....

Term:
[knowledgebase]1235

- [chemspider].....
- [ucum].....
- [national primate research center].....
- [entrezgene].....
- [rgd].....
- [maizegdb].....
- [chebi_par_id].....
- [cas].....
- [umdns].....
- [metlin].....
- [mim].....
- [uniprot].....
- [cdisc].....
- [molregno].....
- [conceptwiki].....
- [meddra].....
- others might be added in future

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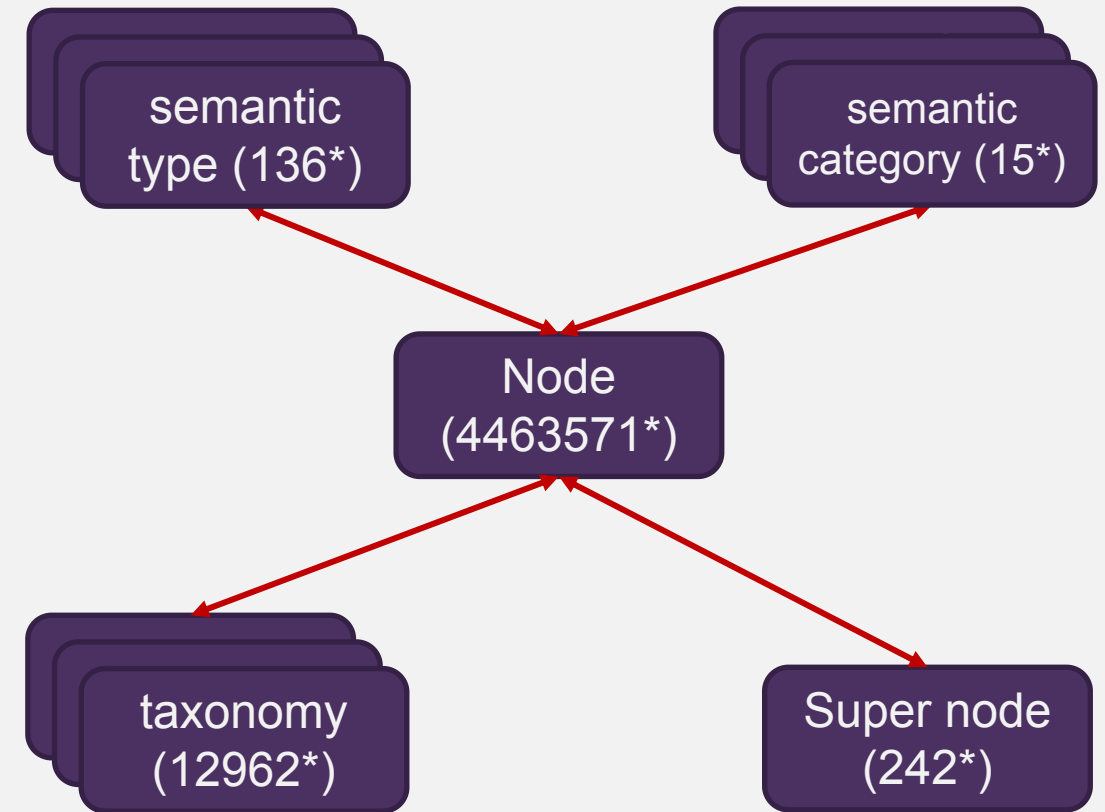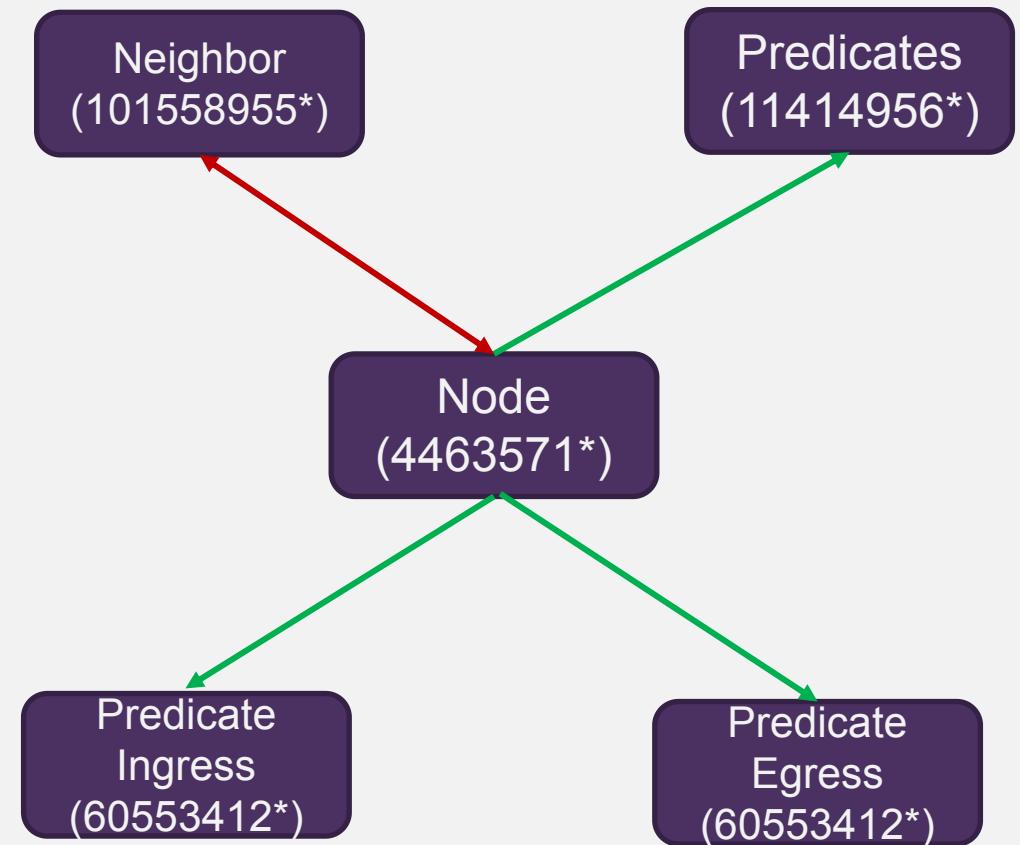   - concepts, triples and publications by id

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About nodes

- Internally a concept is seen as a node... sorry for the semantic confusion :-)
- Each node has membership
- Membership is bi-directional

- A query can take any starting point
- A query can be based on Union, Intersect, Difference (Venn diagram)
- Result is link based

semantic type (136*)

semantic category (15*)

Node (4463571*)

taxonomy (12962*)
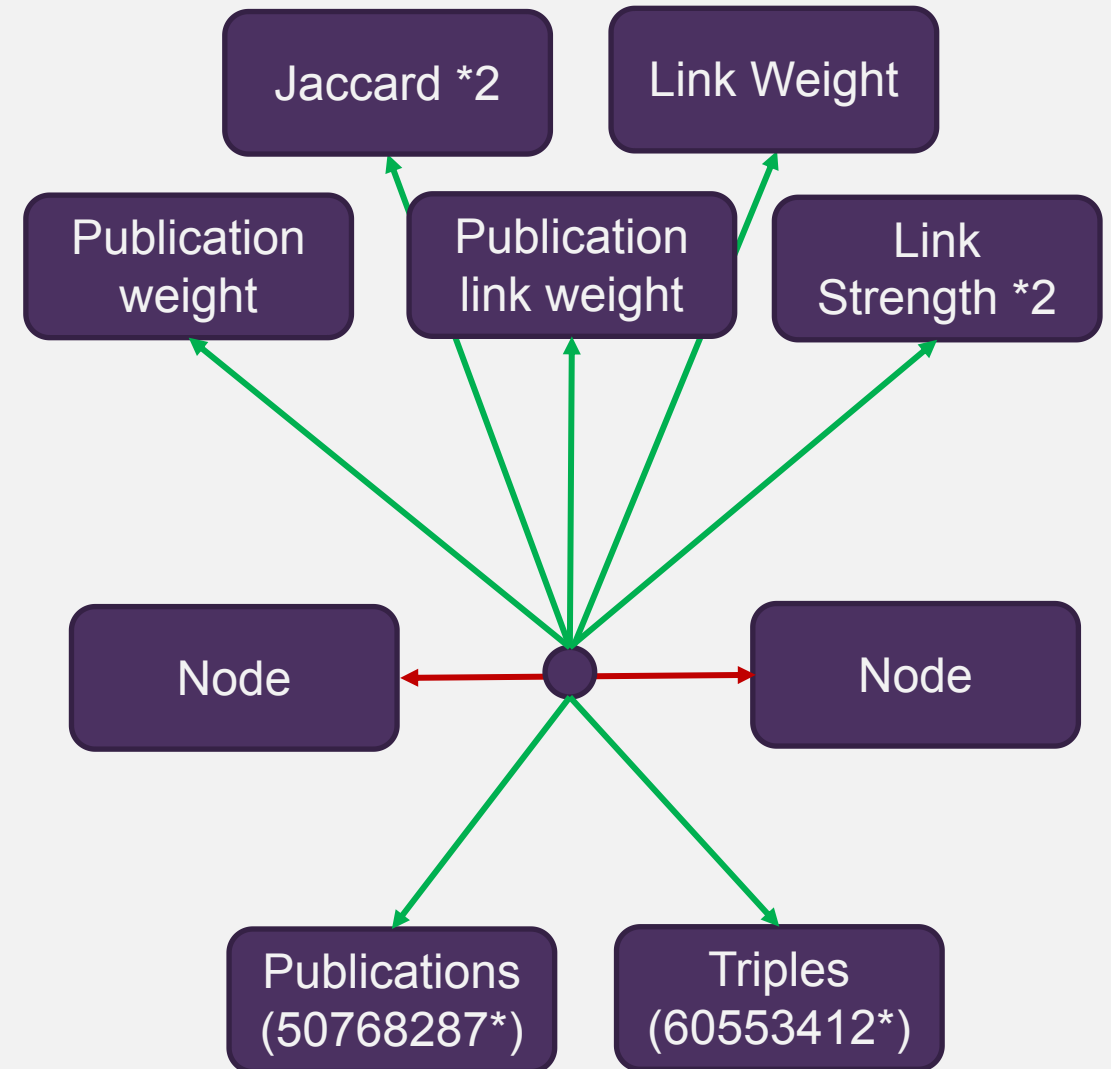
Super node (242*)

*Feb 2016

About relations

Ξ Most memberships are uni directional

Ξ A query can be based on Union, Intersect, Difference (Venn diagram)

Ξ Predicates

⊢ which predicate types connect to node?

Ξ Predicate Ingress / Egress

⊢ neighbors with specifc predicate and direction?

Ξ Neighbors

⊢ Link based neighbors?

*Feb 2016

Neighbor
(101558955*)

Predicates
(11414956*)

Node
(4463571*)

Predicate
Ingress
(60553412*)

Predicate
Egress
(60553412*)

About links

Ξ Link association provides access to:
- ⊢ sorting and ranking algorithms
- ⊢ publications
- ⊢ triples

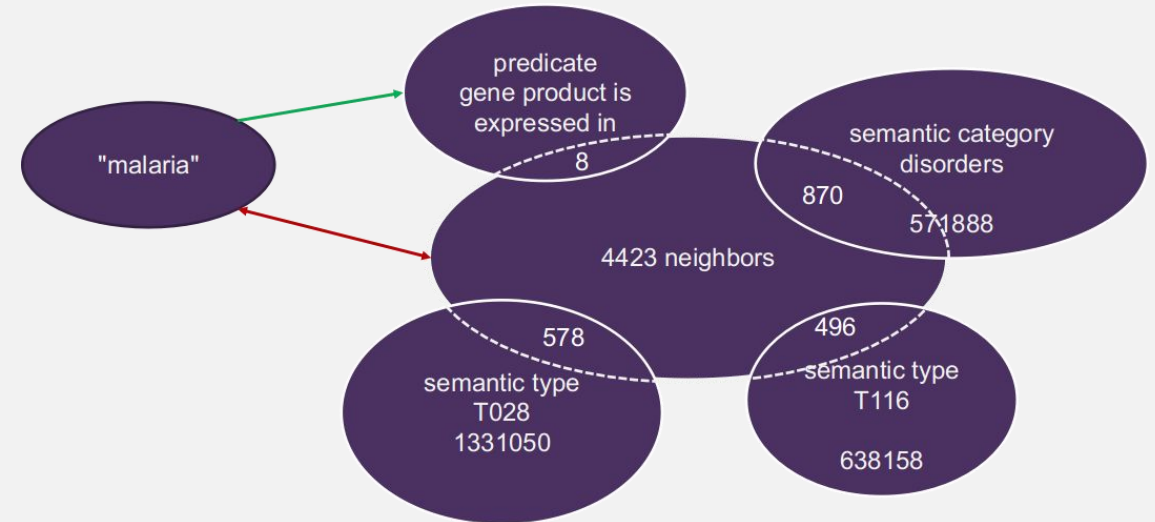*Feb 2016
*2 not available through api

About optimization

- Multiple links to Rome :-)

- Recommendation to build
  paths using link association

- Pick a starting point (node) and see how you can minimize the neighbor nodes

- Once done, decide which meta data needs to be associated

- http://euretos-dev-brainv2.stcorp.nl/spine-api/swagger-ui/swagger-ui.html

- users created from student1@euretos.com to student12@euretos.com
- all have password 111111

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Request and response model

- Request requires concept name or concept id, triple id, publication id
- Request can include "additionalFields" key to enrich the response
- By default response is minimal, often name and id

Concept additionalFields
- *"description",*
- *"semanticCategory",*
- *"semanticTypes",*
- *"taxonomies",*
- *"measures",*
- *"accessMappings",*
- *"hasTriples",*
- *"synonyms",*
- *"source",*
- *"knowledgebase"*

Triple additionalFields
- *"subjectName",*
- *"objectName",*
- *"predicateName",*
- *"subjectSemanticCategory",*
- *"objectSemanticCategory",*
- *"accessMappings",*
- *"measures"*

example

Publication additionalFields
- *"url",*
- *"abstract",*
- *"sourceId",*
- *"sourceName",*
- *"authors",*
- *"keywords",*
- *"geneSymList",*
- *"chemSubList",*
- *"meshHeadList",*
- *"publicationDateAsEpochMillisecondsUTC",*
- *"publicationDateHumanReadableUTC",*
- *"lastUpdatedDateAsEpochMillisecondsUTC",*
- *"LastUpdatedDateHumanReadableUTC",*
- *"measures",*
- *"accessMappings"*

API enumeration

Ξ Most API calls require predefined key and/or value pairs to be succesful

Ξ API enumeration can be used to populate application lists and or functions

Ξ /external/concepts/additional-fields
Ξ /external/concepts/search-keys
Ξ /external/knowledge-bases
Ξ /external/sources
Ξ /external/super-nodes
Ξ /external/semantic-categories
Ξ /external/semantic-types
Ξ /external/taxonomies
Ξ /external/predicates
Ξ /external/publications/additional-fields
Ξ /external/triples/additional-fields
Ξ /external/path-search/additional-fields
Ξ /external/path-search/filters
Ξ /external/scoring-algorithms
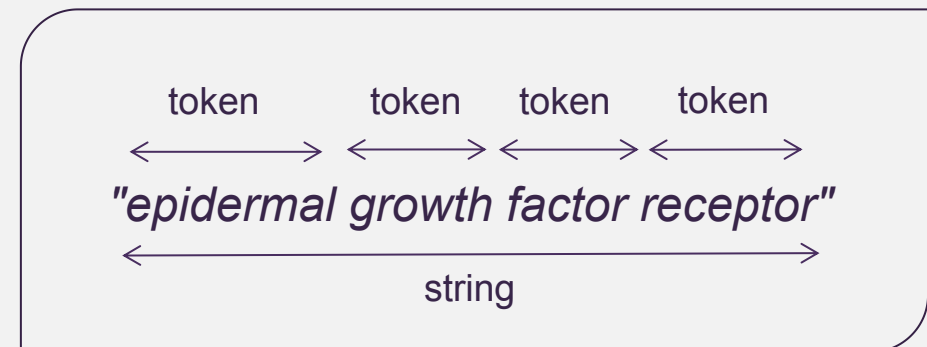Ξ /external/direct-connections-count/additional-fields

API /concepts/search

- Ξ Query can be based on Thesaurus
  key : value pairs

- Ξ Support for *logical* operators
  AND, OR, NOT

- Ξ Use of grouping ( ) supported

- Ξ Search type STRING or
  TOKEN
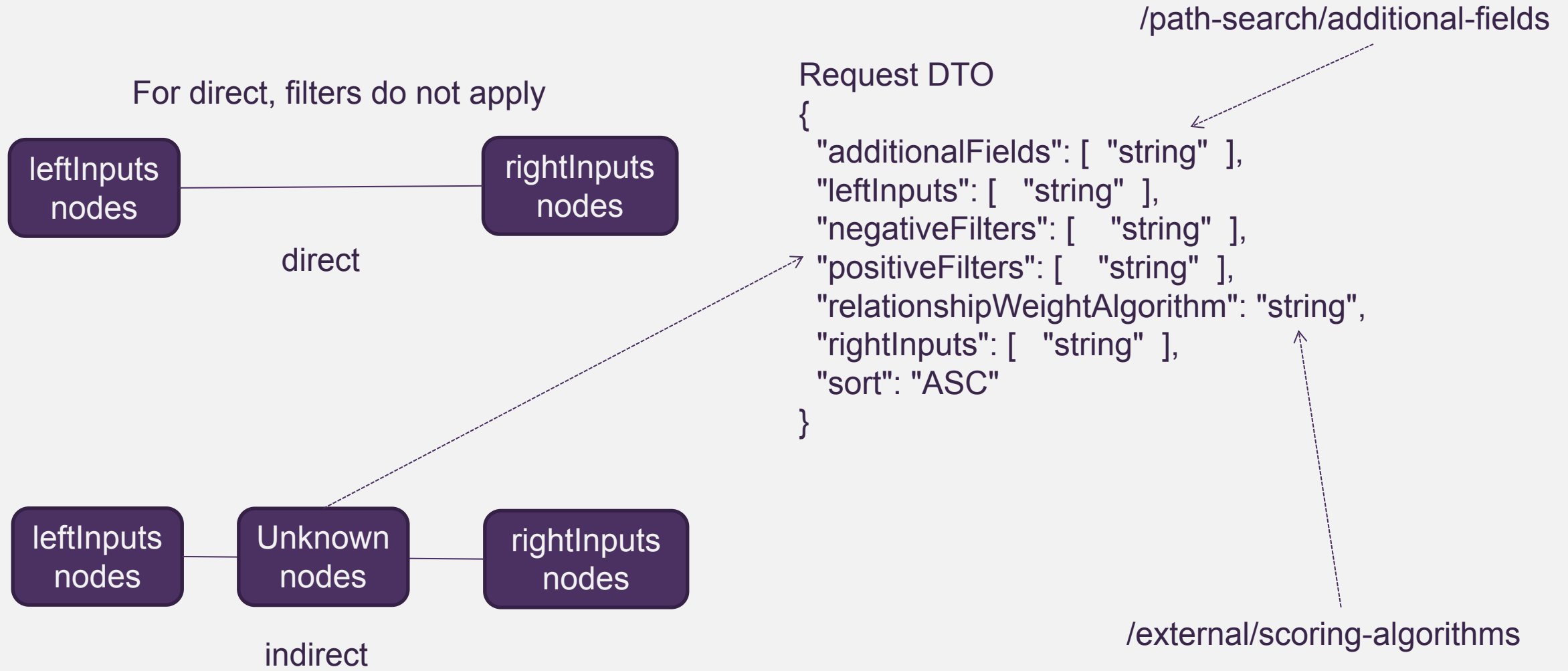
/external/concepts/additional-fields

Request DTO

```
{
  "additionalFields": [ "" ],
  "queryString": "'term:'egfr' AND ( source:'umls'
OR source:'uniprot')",
  "searchType": "STRING"
}
```
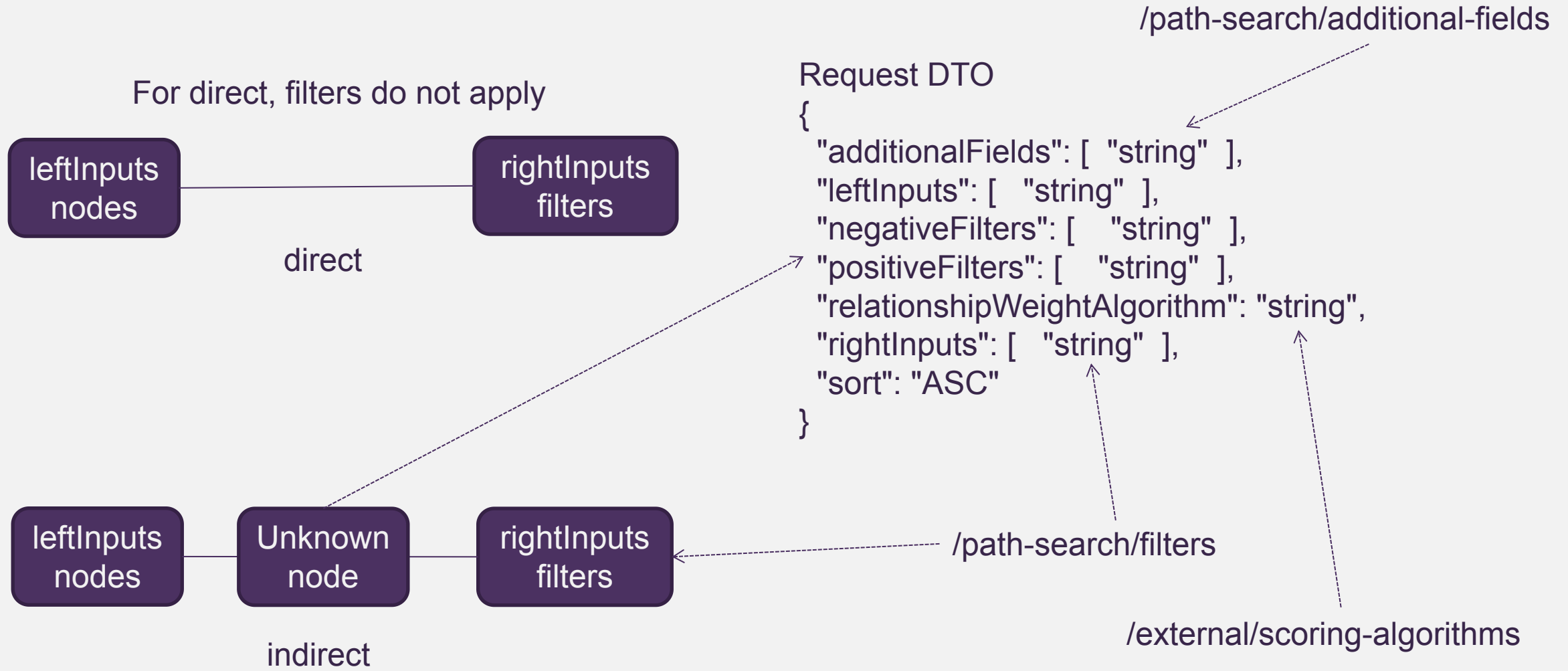
/external/concepts/search-keys

token   token   token   token

⟷   ⟷   ⟷   ⟷

"epidermal growth factor receptor"

string

API /concept-to-concept/(in)direct

For direct, filters do not apply

leftInputs nodes ———— rightInputs nodes

direct

leftInputs nodes — Unknown nodes — rightInputs nodes

indirect

/path-search/additional-fields

Request DTO
{
  "additionalFields": ["string"],
  "leftInputs": ["string"],
  "negativeFilters": ["string"],
  "positiveFilters": ["string"],
  "relationshipWeightAlgorithm": "string",
  "rightInputs": ["string"],
  "sort": "ASC"
}

/external/scoring-algorithms

API /concept-to-semantic/(in)direct

For direct, filters do not apply

/path-search/additional-fields

```
leftInputs
nodes
```
————
```
rightInputs
filters
```

direct

Request DTO
{
  "additionalFields": ["string"],
  "leftInputs": ["string"],
  "negativeFilters": ["string"],
  "positiveFilters": ["string"],
  "relationshipWeightAlgorithm": "string",
  "rightInputs": ["string"],
  "sort": "ASC"
}

```
leftInputs
nodes
```
————
```
Unknown
node
```
————
```
rightInputs
filters
```

indirect

/path-search/filters

/external/scoring-algorithms

API /direct-connections-count

```
ids               additionalFields
nodes             nodes
```

```
{
  "additionalFields": [ "string" ],
  "ids": [ "string" ]
}
```
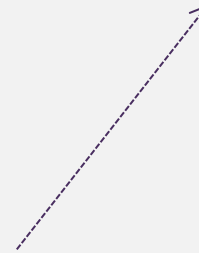
/external/direct-connections-count/additional-fields

ids
nodes

semantic
categories
nodes

```
{
  "ids": [  "string" ],
  "semanticCategories": [  "string" ]
}
```

/external/semantic-categories

/external/path-search/additional-fields

ids
nodes

filterGroups
nodes

```
{
  "additionalFields": [ "string" ],
  "filterGroups": [
    {
      "filters": [ "string" ]
    }
  ],
  "groupExternalCombinationType": "INTERSECTION",
  "groupInternalCombinationType": "UNION",
  "ids": [ "string" ],
  "relationshipWeightAlgorithm": "string"
}
```

"filterGroups": [{ "filters":["sc:Disorders"] },
{ "filters":["predicate:is parent of", "st:T028"] }]

prefix as available within filters
semantic types = st:
semantic categories = sc:
taxonomies = tax:
predicates= predicate:

/external/scoring-algorithms

API /direct-connections-with-scores (2-2)

ids
nodes

filterGroups
nodes

"filterGroups": [{ "filters":["sc:Disorders"] },
{ "filters":["predicate:is parent of", "st:T028"] }]

("sc:Disorders") AND ("predicate:is parent of" OR
"st:T028)

INTERSECTION
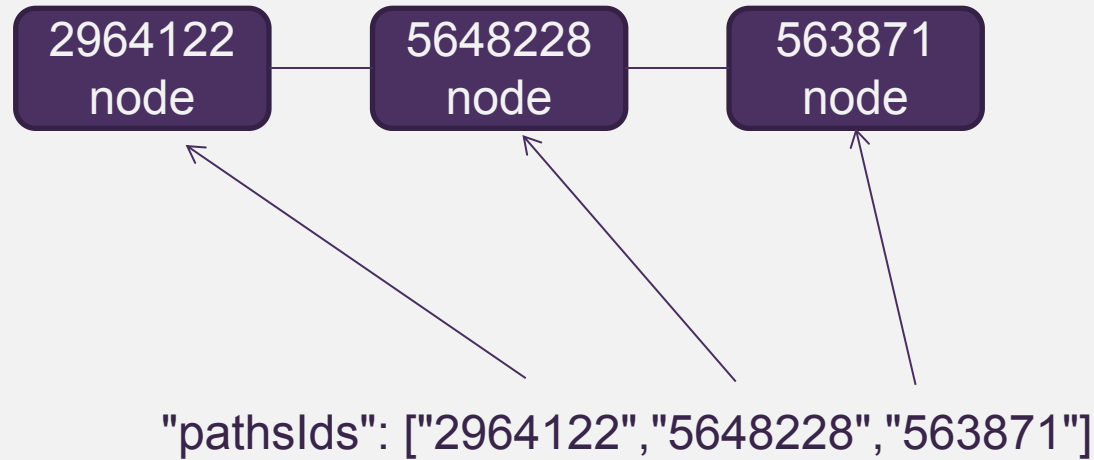(external)

UNION
(internal)

```
{
  "additionalFields": [ "string"  ],
  "filterGroups": [
    {
      "filters": [  "string"   ]
    }
  ],
  "groupExternalCombinationType": "INTERSECTION",
  "groupInternalCombinationType": "UNION",
  "ids": [ "string"  ],
  "relationshipWeightAlgorithm": "string"
}
```

In future this will be
configurable

/external/path-search/additional-fields

| 2964122 node | 5648228 node | 563871 node |

```
{
  "additionalFields": [ "string" ],
  "pathes": [ { "pathsIds": [ 0 ] } ]
}
```

"pathsIds": ["2964122","5648228","563871"]

Ξ /external/concepts
Ξ /external/triples
Ξ /external/publications

```
{
  "additionalFields": ["string" ],
  "ids": [ "string" ]
}
```

/external/concepts/additional-fields

/external/triples/additional-fields

/external/publications/additional-fields

Ξ /external/concepts{id}
Ξ /external/triples{id}
Ξ /external/publications{id}

```
{
  "additionalFields": ["string" ]
}
```

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Thank you :-)

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