Faceted classifications as linked data
A logical analysis

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ILC research project

Faceted classifications

- Semantically rich KOSs
  Many relationships, like in ontologies

- Many structural elements:
  basic classes, facet indicators, foci, phase relation's...
  + rules: citation order, restrictions on foci...

- Representing them as linked data
  is then a demanding task

Integrative Levels Classification (ILC)

- A faceted classification based on **phenomena**
- Developed since 2004 by an international team
- ILC1 (7,052 classes+facets) published in 2011
- ILC2 (10,845 classes+facets) published in 2019
- ILC2 converted from MySQL to SKOS in 2019

Facets as linked data

- A facet expresses a **relationship:**

  xf   29   f
  painting, in *country*:   Italy

- In the logic of linked data, this is a property in a triple:

  Subject   property   Object
  BasicClass facetIndicator Focus

Facets as linked data

- A facet can belong to a **fundamental category**

  e.g. ILC facet **29** "in *country*"
  belongs to category **2** "in *place*"

- In RDF terms,
  `<29> rdfs:subPropertyOf <2>`

Multi-faceted classes

- **`xf99o29f`** "painting, baroque, in Italy"

  are equivalent to several RDF triples connected by intersection:

  `xf99o ∩ xf29f`
     "painting, baroque"
     "painting, in Italy"

RDF properties

- have a **domain** and a **range:**

```
<29> a rdf:Property;
    skos:notation "29"^^xsd:string;
    skos:prefLabel "in country"@en;
    rdfs:label "in country"@en;
    rdfs:domain skos:Concept;
    rdfs:range <tt>;
    rdfs:subPropertyOf <2>.
```

What are the domain and range of a facet?

- ...It depends on what is meant by "facet"!

- In literature there is ambiguity between
  – facet as a semantic category (nature)
  – facet as a syntactic role (function)

  [Maniez 1999; Hudon 2019]

4 (+2) possibilities

- unrestricted domain / restricted range (to itself/other class)
- unrestricted domain / unrestricted range
- restricted domain   / restricted range (to itself/other class)
- restricted domain   / unrestricted range

Let us use DDC examples

Common facets

- **X** `09` **45**

  "any subject, in: Italy"

  unrestricted domain
  restricted range

Special facets 1

- `786.2` `1` `83`

  "piano, musical form: sonata"

  restricted domain, restricted range

- Case 1: range is restricted to music itself (**bound s.f.**)

- Occur only in few DDC classes, such as music

Special facets 2

- **782 3 45**
  "vocal music for service, of religion: Hinduism"

  restricted domain, restricted range

- Case 2: range is restricted to another class
  (**parallel special facets**)

Special facets 3

- **78 00 61**
  "music, in relation with: medicine"

- **02 6 34**
  "libraries, specializing in: law"

  restricted domain, unrestricted range (**free special f.**)

Free facets

- `X 015 X`
"any subject, principles: any science"

- `620.0 015 3`
"engineering, principles: physical"

  unrestricted range, unrestricted domain

- Only available with sciences (`015`) in DDC

- but could easily be extended to any class
e.g. using `00 + 001/999` !

Facet types

- **Common facets**
  - **Bound**:   d. unrestricted, r. restricted to domain
  - **Parallel:** d. unrestricted, r. restricted to other class
  - **Free**:   d. unrestricted, r. unrestricted
- **Special facets**
  - **Bound**: d. restricted, r. restricted to domain
  - **Parallel**: d. restricted, r. restricted to other class
  - **Free**:   d. restricted, r. unrestricted

Facet types

- ILC has ways to distinguish them in notation
  ...just trust me ;-)

- These are reflected in SKOS version of ILC
  by definitions of domains and ranges

Conclusions

- Facets can be expressed in RDF as properties

- They can be subproperties of fundamental categories

- Multi-faceted compounds = Intersections of triples

- The need to express ILC in SKOS
  stimulated a more formal distinction of facet types

- Other classifications can benefit of such analysis
  and introduce more facet types,
  e.g. free facets by `–00–` in DDC

...Thanks!

- **iskoi.org/ilc**

- T: @scritur

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```
<http://www.iskoi.org/ilc/2/class/d93> a rdf:Property;
    rdfs:domain <http://www.iskoi.org/ilc/2/class/d>;
    rdfs:label "attracted by fundamental
interaction"@en;
    rdfs:range <http://www.iskoi.org/ilc/2/class/daf>;
    rdfs:seeAlso
<http://www.iskoi.org/ilc/2/details.php?no=d93>;
    rdfs:subPropertyOf
<http://www.iskoi.org/ilc/2/class/d9>;
        <http://www.w3.org/2004/02/skos/core#altLabel>
"attracted by force"@en;
        <http://www.w3.org/2004/02/skos/core#notation>
"d93"^^xsd:string;
        <http://www.w3.org/2004/02/skos/core#prefLabel>
"attracted by fundamental interaction"@en.
```