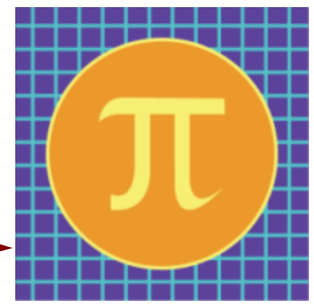
Reimplementing the **MSC (Mathematics Subject Classification)** as a **Linked Open Dataset**

http://msc2010.org/mscwork/

foaf:homepage

foaf:image



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Higher order Osserman pseudo-Riemannian manifolds of neutral signature $(2, 2)$

Cătălin Şterbeţi

Abstract

In this paper we construct a family of pseudo-Riemannian metrics of neutral signature $(2, 2)$ which leads to k-Osserman manifolds for all k admissible. For these manifolds the generalized Jacobi operator is 2-nilpotent. Conditions for locally symmetry on the considered manifolds are established.

Mathematics Subject Classification: 53A45, 53C35, 53C50.

Key words: generalized Jacobi operator, locally symmetric.

skos:prefLabel

Three-level tree structure:

52 Convex and discrete geometry

53 Differential geometry

skos:broader

53A Classical differential geometry

53A04 Curves in Euclidean space

53A45 Vector and tensor analysis

53B Local differential geometry

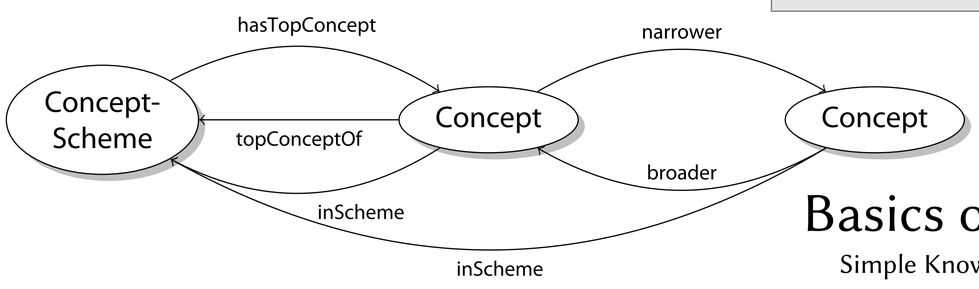
Usage so far (browsing, search, classification, ...):

Old **implementation** (plain TeX):

```
\MajorSub 53-++\SubText Differential geometry
\SeeFor{For differential topology, see \SbjNo 57Rxx.
For foundational questions of differentiable manifolds, see \SbjNo 58Axx}
\SecndLvl 53Axx\SubText Classical differential geometry
\ThirdLvl 53A45\SubText Vector and tensor analysis
```

Redesign Requirements:

1. facilitate **use** and **reuse**
2. facilitate **maintenance**
3. enable knowledge workers and service developers to **adapt and extend** the MSC
4. allow end users to **explore connections** to related subjects



Basics of **SKOS Core**

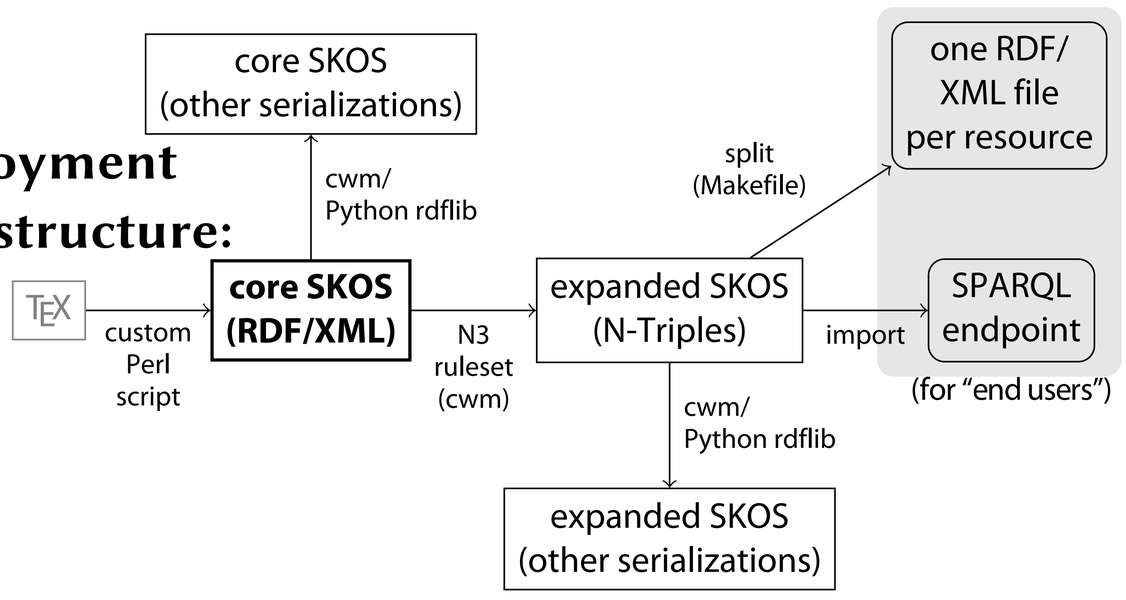
Simple Knowledge Organization System

```
<http://msc2010.org/resources/MSC/2010/53A45>
msc2010:53A45 a skos:Concept ;
  skos:inScheme msc2010: ;
  skos:broader msc2010:53Axx ;
  skos:prefLabel "Vector and tensor analysis"@en,
    "向量与张量分析"@zh ;
  skos:notation "53A45"^^mscsmpl:MSCNotation .
```

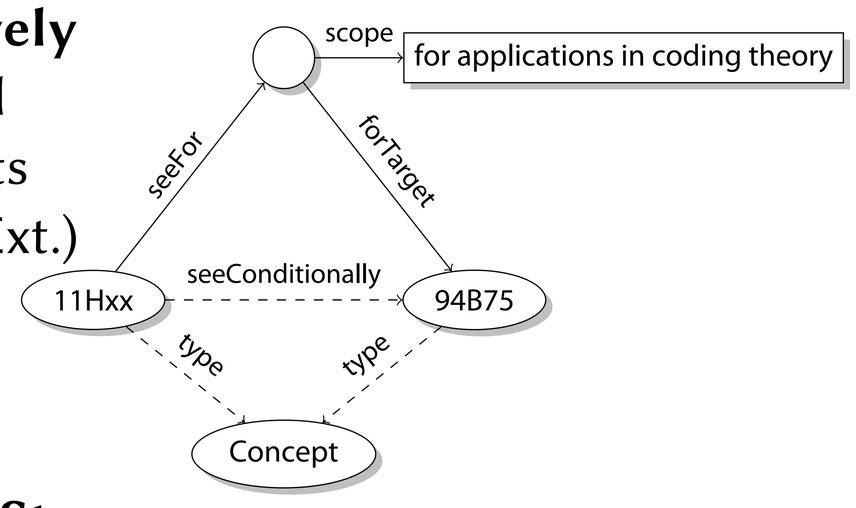
Further **SKOS Features** used:

- <MathML> in labels
- links across MSC versions to reflect changes and aid migration
- links to other concept schemes
- collections (e.g. “historical topics”)

Deployment Infrastructure:



Partitively Related Concepts (SKOS Ext.)



In Use: **PlanetMath's** “browse by subject”:

```
PREFIX msc:  <http://msc2010.org/resources/MSC/2010/>
PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
PREFIX dct:  <http://purl.org/dc/terms/>
SELECT DISTINCT ?subclass ?notation ?label COUNT(?article) WHERE {
  msc:53Axx skos:narrower ?subclass . # get subclasses; then, for each subclass:
  ?subclass skos:notation ?notation ;                 # get the MSC class number
  skos:prefLabel ?label .                              # get the preferred label
  OPTIONAL { ?article dct:subject ?subclass } # get classified articles (if any)
  FILTER langMatches(lang(?label), "en")                  # only English labels
}
GROUP BY ?subclass ?notation ?label   # grouping just needed for COUNT() to work
```

Next Steps:

1. **Community building**: official announcement by MR/Zentralblatt, and to Linked Data community
2. **Improving retrieval**: adding precise definitions of the MSC classes; adding index terms to classes; introducing a faceted structure (beyond collections)
3. **Weaving the Web of Data**: connect to DBpedia, OpenMath CDs, ACM Computing Classif., EuDML, ...

We enable **fine-grained classification** of mathematical resources smaller than articles (e.g. blog posts, tweets). Effect: **democratization of scientific publishing**, **towards networked science**