Computer-Assisted Content Standard Assignment & Alignment

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Research Problem

- Bulk of resources in digital libraries do not indicate which content standard they support
- Assigned content standards typically at national level, teachers prefer state level (Devaul & Kelly, 2004)
- Completely automated assignment is unrealistic

Task 1: Build recommender tool

- Create computer-assisted standards assignment recommender tool
- Uses software developed and tested in prior NSDL study
- Suggests to human cataloger 1-5 most relevant content standards
- Cataloger selects and assigns standard
- Vetted assignments are learned by the system
  - Informing future standard recommendations
  - Resulting in increased accuracy

Task 1 Details

- Implement selected machine learning algorithm in assignment tool
- Extend tool to include hyperlinked resources
- Incorporate tool into a recommender system for Computer-Assisted Standard Assignment.
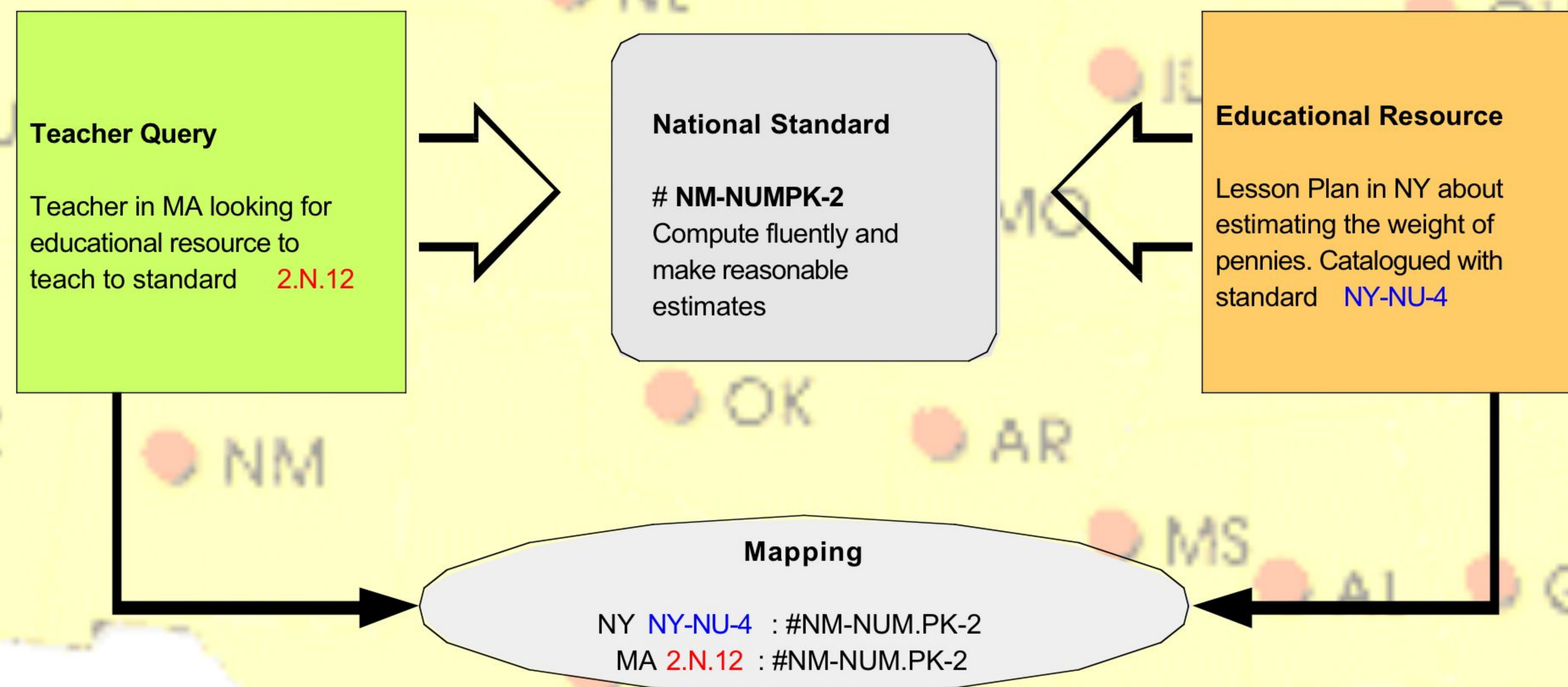
Task 2: Create standards crosswalk

- Develop methodology and tool to automatically create crosswalk between state standards and their national counterparts
- National standards function as "exchange standard" through which
  - any state standard maps to any other state standard
  - any state standard maps to any national standard
- Mapping facility can be incorporated into various educational resource repositories (e.g. NSDL)
- Educational resources can be easily shared once a translation between state standards is facilitated.

Project Goals

Provide two services for collection providers and pathways projects:
1) A computer-assisted standards assignment recommender tool
2) A methodology and technology for automatically aligning state standards to select national standards

Teacher Query

Teacher in MA looking for educational resource to teach to standard   2.N.12

National Standard

NM-NUMPK-2
Compute fluently and make reasonable estimates

Educational Resource

Lesson Plan in NY about estimating the weight of pennies. Catalogued with standard   NY-NU-4

Mapping

NY NY-NU-4   : #NM-NUM.PK-2
MA 2.N.12   : #NM-NUM.PK-2

Task 2 Details

- Integrate subject thesauri and ontologies
- Include the notion of mapping strength
- Include the notion of matching levels
- Add human validation step
- Create XML-based exchange format for content standard mapping

Project scope

- K-12 Math and Science content standards
- 5 State standards:
  - Colorado, New York, Massachusetts, Minnesota, Ohio
- 3 National standards:
  - National Science Education Standards (NSES)
  - National Council of Teachers of Mathematics (NCTM) Principles and Standards for School Mathematics
  - McREL's Compendium of K-12 Standards

Evaluation

- System-based evaluation
  - Using DLESE collection
  - Standard to lesson plan assignment quality
  - State to National standard mapping quality
- User evaluation
  - Using catalogers and standards experts
  - Evaluate recommender tool at UCAR
  - Evaluate state to national mappings

Broader impacts

- Tool and methodology are generalizable
- Project is portable and repeatable in other disciplines and domains
- Educational resources can be easily shared from anywhere in the country once a translation between state standards is facilitated

Benefits to NSDL

- Mapping facility can be incorporated into search capabilities of educational resource repositories such as NSDL
- Teachers anywhere in the US will be able to easily locate appropriate resources in the NSDL that are tied to a desired content standard for their particular state.

Partners

- Combined team of
- Center for Natural Language Processing (CNLP)
- The Digital Library for Earth System Education (DLESE) Program Center at the University Corporation for Atmospheric research (DPC/UCAR)
- Worcester Polytechnic Institute (WIP)

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