Kwiz, a Knowledge-acquisition Framework to Encode Guidelines

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Agenda

- Introduction: Guideline modeling and guideline workbench
- Kwiz overview
- Demonstration of Kwiz in SAGE
- Demonstration of Kwiz in PRODIGY
- Questions and answers
Use of Clinical Practice Guidelines to Improve Healthcare

- Expected benefits of clinical practice guidelines
  - improve clinical practice
    - recommend evidence-based best practice
    - reduce small area variation that is due to custom rather than to differences due to patient characteristics
  - Reduce cost of clinical care
- Thousands of guidelines have been created by professional organizations, HMOs, government agencies
- Traditional dissemination model ineffective
Model-Based Guideline Knowledge Base

Begin or Continue Lifestyle Modifications

Not at Goal Blood Pressure (<140/90 mm Hg)
Lower goals for patients with diabetes or renal disease (see chapter 4)

Initial Drug Choices

- Uncomplicated Hypertension
  Diuretics
  Beta blockers

- Compelling Indications
  Diabetes mellitus (type 1) with proteinuria
  - ACE inhibitors
  Heart failure
  - ACE inhibitors
  - Diuretics

Specific Indications for the Following Drugs (see table 9)

- ACE inhibitors
- Angiotensin II receptor blockers
- Alpha-blockers
- Beta-blockers
- Calcium antagonists
- Diuretics

- Start with a low dose of a long-acting once-daily drug, and titrate dose
- Low-dose combinations may be appropriate.

Guideline Knowledge Acquisition Process
Consider adding an ACE Inhibitor because of a compelling indication (heart failure).
Tool Support for Guideline Knowledge-Acquisition Process: SAGE Project

- Standards-based **Sharable Active Guideline Environment**
- An R&D consortium to develop the technology infrastructure to enable computable clinical guidelines, that will be shareable and interoperable across multiple clinical information system platforms
- Partners in the project are:
  - IDX Systems Inc.
  - Apelon, Inc.
  - Intermountain Healthcare (IHC)
  - Mayo Clinic
  - Stanford Medical Informatics (SMI)
  - University of Nebraska Medical Center (UNMC)
- Funded by: NIST Advanced Technology Program
- Selected Protégé as the guideline knowledge-acquisition environment
Protégé

- Originated as Mark Musen’s 1987 PhD dissertation
- A tool which allows you to create and maintain a knowledge base by:
  1. constructing a domain model using classes and slots
  2. customizing forms for acquiring instances of classes
  3. entering knowledge as instances
  4. customizing user-interface widgets for your domain
- An platform on which you can add functionalities through several extension mechanisms
- An NLM funded open source national resource with several thousand active users around the world
Guideline Knowledge Acquisition in Protégé

- Guideline model and external resources (e.g. terminologies) as Protégé classes
Guideline Knowledge Acquisition in Protégé

- Guideline model and external resources (e.g. terminologies) as Protégé classes
- Specific guidelines (e.g. diabetes guideline) as Protégé instances
Kwiz: a Knowledge-Acquisition Framework to Encode Guidelines

- A model-based approach to formalize narrative guidelines for clinical decision support
- A life-cycle view of guideline encoding and usage
- Tool support built on top of robust and extensible Protégé knowledge-engineering environment
- Kwiz creates additional capabilities that facilitate guideline encoding process
KWIZ – A Knowledge-Acquisition Framework to Encode Guidelines

The Goal: To improve the knowledge acquisition environment especially for novice users.

- Customizable high-level views of the knowledge base
- Constrained navigation
- Reuse of already encoded guidelines
- Context-sensitive search and help
Guideline Knowledge Acquisition Process

Guideline Model

Source Documents

Clinical Scenarios

Distillation, Semantic Refinement

Guideline Encoding

Validation/Review

Reuse

External Resources (Reference terminologies, organizational model..)

Library of Encoded Guidelines

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Library of Encoded Guidelines
Guideline Execution

Clinical Information System

Events

Recommendations

Guideline Execution Engine

Diabetes Guideline Knowledgebase

Patient Data
Guideline Knowledge Acquisition Process

- **Guideline Model**
  - Source Documents
    - Clinical Scenarios
- **Distillation, Semantic Refinement**
- **Guideline Encoding**
- **Validation/Review**
- **Reuse**
- **External Resources** (Reference terminologies, organizational model..)
- **Library of Encoded Guidelines**

**Acquisition Process**

- **Acquisition Process**
  - **Encoding**
  - **Validation/Review**
  - **Reuse**
  - **Library of Encoded Guidelines**
Guideline Knowledge base
Validation & Testing

- Facet Constraints Checking
- PAL Constraints Checking
- Guideline Execution Constraints Checking
- Guideline Simulation
Conclusion

- KWIZ provides a controlled knowledge acquisition environment especially for novice users.
- Protégé, KWIZ and other applications provide an integrated environment for guideline encoding.
Efficient Copy

To be copied Instance Tree in the Library

Already existing Instances in the Working Knowledge Base

Copied Instance Tree in the Working Knowledge Base