Rule-Based VUI Design

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August 7, 2006
Rule-Based Design

• What is it?
• Benefits
• Is it right for you?
• Justifying it
• How does it help the designer?
• Possibilities
Rule-Based System

• Captures an SME’s knowledge into an automated system (*expert system*)
• Knowledge is captured in *rules*
  – Each rule has a *condition* and *conclusion*
  – The condition operates on *facts* which must be true in order to *fire* the conclusion
Rule-Based System

• Rule Examples
  if loan is more than 30 days delinquent
    then set transfer to rep to true
  if loan is in foreclosure
    then set payment not allowed to true

• Modularity
  – Order doesn’t matter
  – Rules stand alone
Rule-Based System

Interpreter

Working Memory

Knowledge Base

Facts

Rules
Benefits

• Quick and easy to add rules
  – Rules can be entered naturally by the domain expert

• Better communication
  – Rules can be understood by non-programmers

• Easy to maintain
  – Rule maintenance is separate from the rest of the application
Rules vs. Procedural

• In procedural languages, order matters and involves branching

\[
\text{if (loan.overdue() } \geq \text{ 30 } \&\& \text{ !loan.bankrupt())}
\]
\[
\quad \text{then transferToCollectionsForPayment()}
\]
\[
\text{else if (loan.overdue() } \geq \text{ 15 } \&\& \text{ !loan.bankrupt())}
\]
\[
\quad \text{then requestImmediatePayment()}
\]

• Using rules can remove the complexity

\[
\text{if loan is in bankruptcy}
\]
\[
\quad \text{then set ask for payment to false}
\]
Applications

If you have any of the following…

- Multiple interfaces – web, phone, multi-modal
- Lots of business logic
- Frequently changing business logic
- Lots of adaptation or personalization
- Repeat callers who are identifiable

…then your application is a good candidate for a rule-based approach
Customer Justification

• Control
  – It’s their business logic, they should control it

• Flexibility
  – They should be able to change their business logic without having to hire a consultant to reprogram their application

• Consistency
  – Using a separate rule-based system allows them to provide consistent interfaces on the web and over the phone
Design Savings

• Most of the advantage simply moves the complexity out of the procedural code, but...
  – Training
  – Selling
  – Events/Exceptions
  – Personality
It can be very simple…

• A lot of adaptation can be done by playing different prompts
  – Use rules to determine which prompt to play based on a set of factors
    • DTMF vs. Speech
    • Verbosity
    • Training Level
    • Usage patterns
Usage Data

• A key factor is to incorporate data collection into the application
  – Usage data – keep a diary
    • Simple counts and dates
  – Preferences
  – Session information
• Provides facts for rules to work with
  – Even if you don’t need it today
Beyond Today’s Dialogs

- Natural Language
  - Semantic analysis of caller requests
Beyond Today’s Dialogs

• Dynamic prompt generation
  – Speech synthesis is getting better
  – Allows for sentence generation, not just prompt selection
  – Can solve a lot of localization issues
Beyond Today’s Dialogs

• Dialog flow expressed as rules
  – VUI designers will write rules to specify the flow
  – Applicable to specialized applications with lots of adaptation, personalization
  – Needs better tool support to gain broad acceptance
Empowering Your customers and employees with speech technologies

SpeechTEKI 2006
The Voice Solutions Showcase

Empower

Thank You