Reduce Application Cost of Ownership with Conversational Dialogue

A106 Special topics in Voice Search
Monday, March 10th., 2008.

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“Just Say It”
GyrusLogic the Company

• GyrusLogic, Inc.
  - Phoenix, AZ, USA
  - Privately funded

• Technology
  - 30,000+ hours of software development
  - University projects
  - Patents granted
    - Fuzzy & Exact Natural Language Dialog Processing
    - Conversational Dialog Application Development Methodology

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Challenges with Open Ended Dialogs

- Conversations and human responses can be **unpredictable**
  - In many cases, it is impossible to design a dialog flow that anticipates all user’s responses.
  - Case statements, if-then-else and mix-initiative will not do the trick.

- Phrases must be well understood
  - Just picking up keywords doesn’t do the trick. The **context and meaning** of the phrase must be captured.

- Must recognize the difference between a question and a response.
- Distinguishing between **exact** questions and **vague** questions
- Find the **single best response** to the question
- Must **keep track of the context** of the conversation.
  - What were we talking about, and is the user now talking about something different?

- Finish the transaction with the information we need.
- Significantly improve on the Customer Experience and Expectation
- Keep the application development and cost of ownership to a minimum.
How Do We Address the Challenges

• Conversations and human responses can be unpredictable
  – Use AI techniques to build the dialog on the fly, rather than attempting to script the dialog.

• Phrases must be well understood
  – Use a combination of semantics and syntax with computational linguistics.

• Distinguish between a question and a response.
  – Use multiple engines: answer engine and a response engine.
  – A dialog broker recognizes which engine to use.

• Distinguish between exact questions and vague questions
  – Use multiple grammars: automatic user generated grammars for the exact questions and the universal language grammar defining the vague phrases.

• Find the single best response to a question
  – Perform computational linguistics for matching the semantics of the question with the semantics of the knowledge base repository.
  – Perform AI search techniques with heuristics for sorting through possible answers.
Natural Language Understanding

• Traditional approaches for Natural Language Understanding (NLU)
  - Statistical Language Modeling (SLM)
  - Statistical Semantic Modeling (SSM)
    - “Say Anything”, “Speak Freely”
  - Transcription of 20 - 30,000 utterances
  - Procedural developments

• GyrusLogic Platica approach for Natural Language Understanding
  - Robust Linguistic approach coupled with Artificial Intelligence (no SLM)
  - Full conversational capabilities (no transcriptions)
  - Easy industry standard solution (no proprietary scripting)
  - Interfacing existing “Voice” environments (IVR, ASR, TTS, VoiceXML)
  - Declarative developments
  - Significant less effort, with additional operational savings and more application functionality
Our Language Processing

Speech Input

Speech Recognition

Speech Analysis

Speech Understanding

The Right Answer

What does the speaker say?

What does the speaker mean?

What does the speaker want?

Unambiguous Understanding in the Dialog Context

Our Language Processing

Speech Input

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The Right Answer

What does the speaker say?

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Unambiguous Understanding in the Dialog Context

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Typically Two Types of Requests

- **A Fuzzy request:**
  - They can be *spontaneous*, arbitrary, ad-hoc, and/or vague
  - The majority of user queries are *fuzzy* questions
  - The best approximation to satisfy the request
  - User expected accuracy, completeness and an **answer the first time**
    - Do I have some bucks in my account?
    - How much money do I have?
    - What is the amount of the last deposit?

- **An Exact request:**
  - *Specific transactions* don’t allow for fuzzy approach, but they can still be spontaneous. *(expanded directed dialog)*
    - Transfer $100 from checking to savings
    - Did check number 123 clear on July 1st.?
    - I want to travel at 3pm today from Phoenix to Burbank
Dialog Example with GyrusLogic

System: How can we help you?
User: I would like to transfer some cash from my checking to my savings account.
System: How much money do you want to transfer?
User: What do I have in my savings?
System: The balance in your savings account is 4000 dollars.
   I apologize for asking again, how much did you want to transfer?
User: Five hundred bucks please.
System: Ok, let's review this transaction, you want to transfer 500 dollars from your checking to your savings, is this correct?
User: No, actually transfer a thousand dollars from savings!
System: Ok, let's review this request, you want to transfer 1000 dollars from your savings to your checking, is this correct?
User: What did you say?
System: Let's review this request, you want to transfer 1000 dollars from your savings to your checking, is this correct?

Note how the user can be spontaneous and say as much as he wants

Interruption of dialog with any question, even if it was unrelated

The system resumes the previous dialog and requests the missing information

User can make a correction on the fly or ask for a repeat at any point in time

The system still handles the question effectively without coding of business rules
No Dialog Flow Development or Maintenance

- The user application does not need a specification for how the logic of the dialog should look like.
- GyrusLogic’s inference engines mimic human’s reasoning and build the dialog on the fly, thereby delivering a natural conversation.
- It is a true conversational AI system and a true AI declarative paradigm.
- It allows the user to be spontaneous and to interrupt a dialog with questions outside the ongoing dialog.
- It allows the user to make any correction to a specific transaction, either implicit or explicit.
VoiceXML Mixed Initiative Example

- GyrusLogic Platica more spontaneous out of the box!
- Automatic dialog interruption and implicit correction
- Exponential savings for more complex applications

Agent: Thanks for calling Acme Travel Company. How can I help you today?
Caller: I'd like to book a flight.
Agent: Okay. What is your point of origin, and where are you going?
Caller: I wanna fly to Boston, Massachusetts.
Agent: You want to fly to Boston, Massachusetts. Where are you flying from?
Caller: From San Francisco, California.
Agent: Okay, you'll be traveling from San Francisco, California to Boston, Massachusetts. Is that correct?
Caller: Yes.
• How does GyrusLogic’s Platica help?
  - **Declarative** vs. Procedural or Icon based developments.
  - **Implicit and Explicit corrections** without additional coding.
  - Automatic implicit verifications without extra effort.
  - **Spontaneous user interruptions** in call flow without additional development effort.
  - **Context and semantics** recognition.
  - The same application can be used for **Chat, Web and SMS**.
  - Significant **savings in time and money** with the deployment of our Conversational Dialog related applications.
Average Speech Project Deployment Costs

Average Project Costs Today

- Base Software Licence: 27.8%
- System Integration: 19.9%
- Hardware: 11.2%
- Training Installation Support: 13.6%
- Application Development: 27.5%

Average Project Costs with GyrusLogic NLU

- Base Software Licence: 27.7%
- System Integration: 17.8%
- Hardware: 11.2%
- Training Installation Support: 13.6%
- Application Development: 2.7%

> 27% project costs savings

Platica 3.x will improve your project cost of ownership savings to >32%

Source: Voice Information Associates, ASR in Telephony Applications, the World Market

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Operational savings with Conversational Natural Language Systems

• Directed Dialog
  - 1:48 avg. call

• Conversational Dialog
  - 0:57 avg. call

• Savings
  - 51 seconds per call saved
  - Avg. 50,000 calls / day
  - Initial 20% use of conversational dialog
  - Over 3.1 million minutes saved in initial year
Summary of a GyrusLogic NLU Implementation

- Fully conversational dialog system, based upon industry standards
- Flexible answers with enterprise variables in XML knowledge base
- Powerful implicit and explicit corrections, implicit confirmation
- No dialog design, minimal grammar development
- Natural language with context, semantics and meaning understanding
- Spontaneous user interruptions without additional development effort
- Improved “recognition rates” by resolving false positives
- Easy, XML based, implementation of a transactional dialog
- Automatic parsing for corpus development
- Back-end database and application support
- ASR & IVR independent, VoiceXML 2.0 support
- New language Universal Grammar development can be completed in several days
- First contact customer resolution for improved customer satisfaction
- Significant savings in development and total cost of ownership
- Declarative paradigm, the typical developments will be significantly less error prone

Patented context and semantics recognition and parsing technology.
What’s new with our next release Platica 3.x

• **Wizard** for generation of Platica business transaction XML grammars

• Enhanced fuzzy parser to create an even better customer experience and improved speech recognition rate

• Improved automated Speech Grammar generation, **no grammars to be developed**

• Easy Conversational Dialog application **prototype generation** and testing capability
“Just Say It”

Thank You!

Questions, trial or demo, connect with us @

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