Predicting Conversational Moves via Contextual Semantic Trajectories

We need to start modeling *conversations*

Emmett Coin, Speech Scientist, ejTalk
What We Will Talk about

Conversation?
Are people really interested in Conversation?
How are dialogs defined? How should they be.
The spectrum of dialog sophistication.
Some ideas on how to approach the problem.
Fact: We Yearn for Conversation with Virtual Beings
Where Do Conversations Go? (How do they get anywhere?)

- Follow a map?
  - Signposts?
  - Computed route?
  - Planned?

- Flow like a river?
  - Gradients?
  - Channels?
  - Natural?
How Do We Model Them?
(Do we even agree what a conversation is?)

Is it Engineering?

Or Art?

Rules + Learning

Build + Sculpt
The Data Problem: How did DeepMind learn Go?

- Corpus characteristics
  - Already existed
  - Clean/simple data
  - A million recorded, refereed games

- Nature of the problem
  - Pragmatic progress function
  - Easy success function
  - Solution variants can compete (genetic method)

- Cultural interest in a historic game
  - Easy for public to understand the binary win/lose
  - Brand pride
Speech Application Architecture Diagrams

(What they all have in common)
And now...

A word about Chatbots

• Chatbots for simple Turing-like contests have 2 jobs
  • Fool the human
  • For as long as they can
  • [waste a human’s time ... they don’t pretend to do anything]

• Customer service web/mobile chatbot assistants
  • Just drop you on a canned page/statement (essentially just call directors)
  • By any other name they are simple search tools
  • [fall far short of expectations ... are disliked ... then abused]

• Experimental bots explain how they will learn
  • By talking to anyone/everyone
  • By adding your distinctiveness to their own
  • [always learn the worst habits]
The Data Problem: What is conversation data?

- Corpus characteristics
  - Indistinct domain boundaries
  - Variations in tags and annotations
  - Small sample sizes (1,000’s)

- Nature of the problem
  - No simple progress function
  - No simple measure for completion let alone success
  - Not easy to engage 2 systems in useful conversation

- Cultural bias: anthropomorphize vs. disbelieve
  - Hard for public to understand what is happening
  - See no need for (or fear) human-computer conversation
Learning Conversational Elements
What we do, what we need to do

- Call Directors (SLMs, “bag of words” techniques)
  - Large pools of sentences correlated into one small set of semantics
  - “what kind of hammers do you sell” correlates to HARDWARE_DEPT
  - 100K example sentences & 20 semantics is workable

- Conversations
  - Large pools of large pools correlated to a small set of semantics
  - A previous large pool chains to the next large pool
  - Like an SLM problem squared

- Relationships
  - Multiple related conversations over time
  - Maybe like an SLM cubed?
  - Astronomical combinatorial complexity
How can we deal with this complexity?

- Avoid it
  - Just make small command/search types of apps
  - Let the user micromanage them into the bigger picture

- Simplify the “input” state data
  - Compress input phrases into smaller sets of semantics
  - Cluster on these smaller pools of (semantic) input
How Could We Even Annotate a Conversation?
In a way that could be used as input for Machine Learning.

We Need:

• Reduced complexity
• More atomic meanings (semantics)
• Quantifiable measures of
  • progress (in the conversation)
  • success
• Identify discreet states (maybe a large number)
• Parameterize history of the conversation (Trajectory)
Simple Data Can Be Plotted

If we can see the dots and how they are connected ...

Then we can chart a course ...
We will be able to guide a conversation.
Some issues
Or just thoughts?

• We may still have lots of “dots”
  • But they will be discreet

• More “dots” = finer granularity
  • Fine grain systems approach continuous systems ... in the limit
  • Think weather simulations

• Rules can get things started
  • Then can be tuned and augmented with learning
Conversation not Dialog

Presented:
Bellagio Workshop on Human Computer Conversation, Italy
May 17, 2000

A FUNDAMENTAL ARCHITECTURE TO INTEGRATE CONVERSATION MANAGEMENT ENGINES WITH CONVERSATION DEVELOPMENT AND EVALUATION TOOLS

Emmett J. Coin, J. Qua
ejTalk Research
ejTalk.com

ABSTRACT

As the need for dialog design grows, developers will need to build more ambitious conversations more quickly. These conversations will be more complex, more numerous, and be subject to increasing economic pressure [3] to maintain and enhance them. Based on accepted data exchange standards, we propose a system that makes a sensible division of the conversation development [2], runtime and maintenance tasks, while also promoting the usability of autonomous, independent developments in conversation management.

exchange paradigm, not an invocation paradigm. It will work well in a range of environments: procedural calls, COM, simple IP, etc.) It will also allow very specific, internal component information to be passed to the transcript with no impact on the system overall. Another powerful benefit is that components can communicate "suggestible" parameters to each other, even before the recipient of a suggestion has support for it.
An Example Built from Semantic Elements
(if we have time)

http://www.ejtalk.com/v2/video.html

https://youtu.be/1Oi2Sd2Pr2w
Thank you!

Emmett Coin
Speech Scientist
ejTalk
emmett@ejTalk.com