Jimmy's World: making sense of everyday life references

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Background: An AI retrospective

MILESTONES IN AI

- Conceptual dependency (R Schank 69),
- Case grammar (C Fillmore 68), semantic frames
- Universal Grammar G N Chomsky 70, 80's),
- Prolog (A Colmerauer 70's)
- PROBLEM Manually crafted rule-based are expensive to scale
- Today Machine Learning – king of the road

North Side approach

- North Side approach: Massively rule-based NLU to complement Machine Learning.
- We don’t hand write rules! We mine *syntactic* and *semantic* rules from dictionaries.

WHAT A MORE DETERMINISTIC APPROACH DOES

- ML dialogues (Siri, etc) are typically 1 – 2 turns
- Our users’ dialogues have > 500 turns of coherent, consistent conversation, explore complex information
- Tech Demonstration vehicle: Bot Colony videogame

Why *broad* language understanding matters? (CIconf2018)

- A ML-based chatbots is developed for a particular vertical application
- Chatbots are built to support a number of intents (skills) in a particular vertical.

HOWEVER, users don't know/don't care about chatbot limitations and will say

- things peripherally related to the chatbot intents
- unexpected things
- incomplete utterances
- To boot, they will use their own words!

COST OF NOT UNDERSTANDING THE USER: The experience suffers

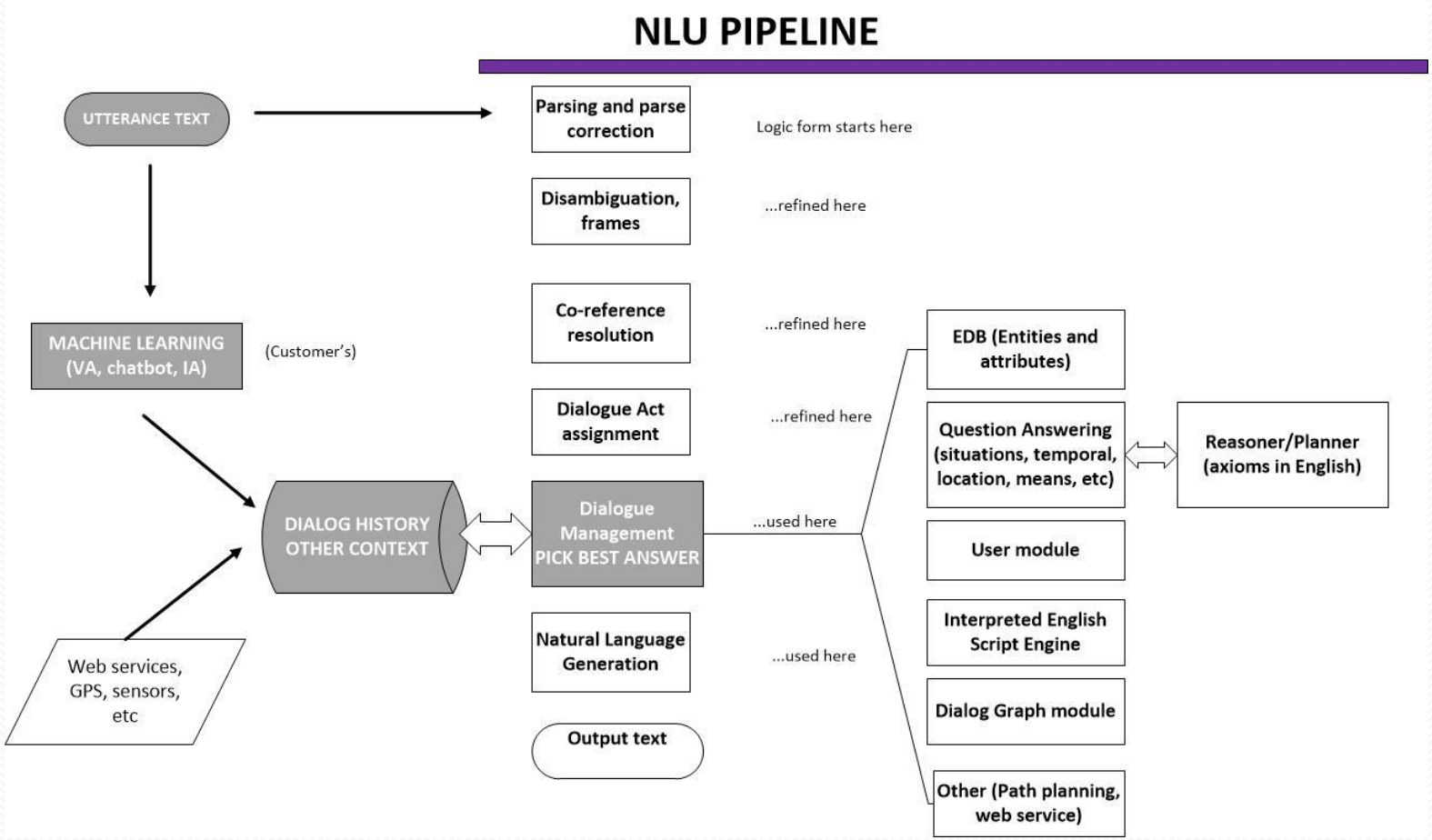
The U in NLU: Understanding requires linguistic knowledge + world knowledge

- Words refer to things in the world, to situations in the world, to properties of things or situations
- You need to know the words and syntax (linguistic k.)
- Word semantics: a word bundles a lot of meaning:
  - Float (something X, X is on the surface of some liquid Y, X moves or not)
  - Sink (something X, X was on the surface of Y, then X moved under the surface of Y, X stayed there).
- You need to know about the world (world knowledge), water, floating objects, submerged, sinking, etc.

ML + rule-based = the best of both worlds

- In ML approaches, knowing what words means (or how the world works) is not that important.
- ML works on probabilities of strings (symbols) appearing in a certain sequence. ML has great coverage!
- We process language differently, with a NLU pipeline. We analyze every word and phrase in a clause. We have great precision!

North Side NLU pipeline



World Knowledge: how to get it?

- Broader understanding requires **massive** world knowledge about the world (any concept!).
- We've mined a lot of reliable knowledge from MRD's
- We plan to acquire a lot more world knowledge with Jimmy's World, a free videogame

Jimmy's World intro

- A free, online game. (*under development!*)
- Objective: Teach your bot about things in everyday life that you're interested in
- Initially visible things, eventually any concept
- Your bot learns from conversations with you - about particular words and/or about photographs
- When your bot is ready, compete it against other players' bots in a Jeopardy! for bots.

Jimmy’s World demo

- VIDEO

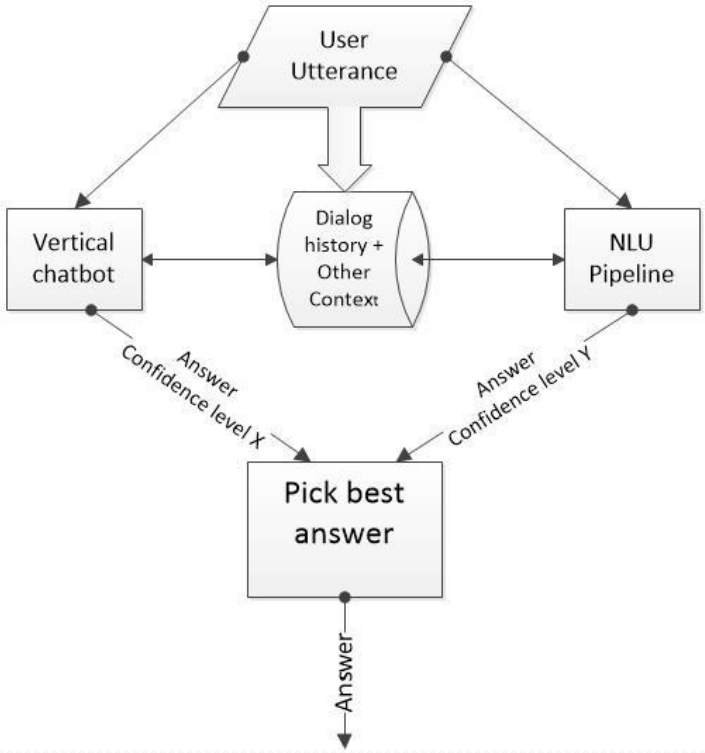
https://youtu.be/4o-IzyxAYDE

Future product: Knowledge-rich ‘chatbot helper’ that will help your chatbot understand better

- Chatbot helper will use JW knowledge,
- Will work alongside existing chatbots
- Will help your chatbot process user utterances it can’t handle, **by providing context.**

Hybrid ML/knowledge-based NLU

ML chatbot integrated with NLU pipeline



SUMMARY

- Chatbots able to better understand the ***everyday life context of an utterance*** will offer more relevant answers and will be a lot more engaging.

- **QUESTIONS ?**