The Future of Personal Assistants

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Yesterday’s “Personal Assistants”
Today’s “Personal Assistants”
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- Voice search/ Web-search
- Question Answering. One-Shot
- Chatbot/ Stimulus-Response operation
- Specialized – Hard-coded custom applications
- Vendor centric/ Smartphone app
- Passive/ Reactive

- Very limited understanding, ontology, and general knowledge
- Limited conversation, memory, personalization, learning, etc.
Tomorrow’s “Personal Assistants”

- Wide Range of **General** Skills and Knowledge
- Skills and Knowledge are **Integrated**
- Real **Understanding**
- Increasingly **Personalized** Knowledge and Skills
- Many modes of **Learning** (incl. Tool Use)
- Conversational and Goal-Directed
- Proactive
- **Meta-Cognition, Introspection and Self-Awareness**
Conventional Apps

Static – Pre-Built

Apps with a Brain

Dynamic Evaluation & Flow

Intelligence Engine Core

Additional Knowledge
Really understanding...

“I’ll meet him at our new bank, same as last time – got it?”

Knowledge Base
Deep Parsing
Context
Memory
Goal Oriented
Conversation Skills
Learning
Some Features of Brain-based Apps

- **Language Knowledge**: Large vocabulary of words and phrases.
- **Plural, tenses, abbreviations, synonyms, homonyms**, etc.
- **Ontology**: Entities/attributes/relationships, abstract/concrete
- **Common sense facts about customers, products, time, etc.**
Some **Features** of Brain-based Apps

- Statistical parse & semantic parse
- Meaning extraction “...next Tuesday in the afternoon”
- Fuzzy grammatical parsing
- Using context, memory, and goals
Some **Features** of Brain-based Apps

**Context**

- Who is the speaker? (14 versus 40, expert?)
- Where are calling from? (home, vacation, cell, etc.)
- When and why are they calling?
- What transpired before?
Some **Features** of Brain-based Apps

**Memory**

- **STM** – What was said earlier: “...can you cancel that first order?”
- **LTM** – Previous conversations: “I would like it at the usual time”
- **LTM** – Personalization: “...you still prefer express shipping?”
Some **Features** of Brain-based Apps

**Goal Directed**

- Identifying goals
- Multiple ways to achieve goal
- Knowing when goal is achieved
Some **Features** of Brain-based Apps

- Learning new or personal phrasings (what they mean)
- Learning general or personal preferences
- Learning how issues were clarified effectively
- Learning effective goal strategies
Acquiring Knowledge & Skills

- Built in
  - Feature extractors/encoders
- Look up
- Instance learning (one-shot)
- Unsupervised (clustering)
- Exploration (random or structured)
- Ape (copy/mirror)
- Guided (hand holding)
- Instructed (voice, gesture, text, etc)
- Supervised (categorize, label)
- Self-supervised (internally monitor results)
- RL (explicit reward signal)
- Study (read, view)
- Figure out
Other Cognitive Features

- Perception
- Focus
- Concept Formation
- Action Sequences
- Tool Use
- Reasoning
- Meta-Cognition
- Introspection
- Self-Awareness
Further Out...

• Trusted Advisor

• The ‘Extended Self’?
Thank You

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