Intermediaries

Jane Hsu

What Are Intermediaries?

- Narrow view: a middleman, coming between a buyer and a seller in a specific transaction
- Broader view: anyone along a point of the entire value chain from raw inputs to final consumption
- Example: Dell collects hardware and software from a variety of suppliers, and assemble them into computers that are ready to use.

Economics of Intermediaries

- Intermediaries are specialists.
- Economies of scale
  - Knowing a neighborhood as a realtor can allow serving many buyers
- Economies of scope
  - Range of intermediary functions or services

Information Revolution

- Industrial revolution
  - Steam engines
  - Railroads
- Information revolution
  - Computers
  - E-commerce

The E-Commerce Revolution

- A new economic dimension
- A new *mental geography*

- Distance has been eliminated.
- There is only one economy and only one market.
- Every business must be *globally competitive*!
- E-commerce has not revolutionized the way we transact goods and services.
- Humans are still very much in the loop!

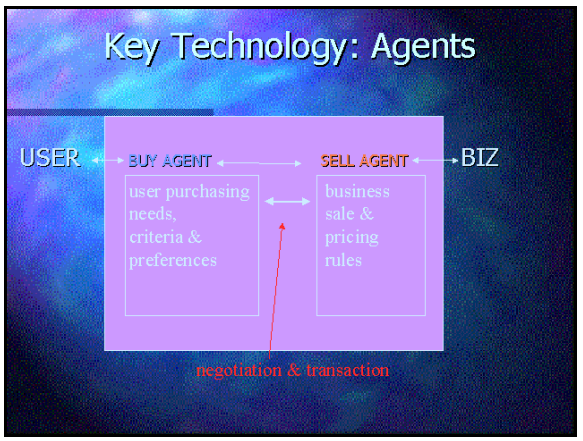
New world of E-commerce

Business opportunities:
- efficient channel
- large market

Business challenges:
- customer attention
- customer loyalty

Customer opportunities:
- choice
- convenience

Customer challenges:
- finding relevant stuff
- trust & privacy



Motivation for Agents in E-Commerce

- Task-delegation
- Personalized
- Continuously running
- Semi-autonomous

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Agent As Mediator

- In a dynamic marketplace it is impossible for traders to maintain an up-do-date list of contacts
- Mediators are facilitators or infomediaries that set up relationships between trading parties
- Mediators provide shared information (e.g. user ratings of products), contexts for the interaction of role agents (e.g. market sessions), and facilities for introducing role agents to each other
- Mediators include directory services, transcoders, recommendation brokers, and market makers

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Main Components of E-Commerce

"E-commerce is one of the most promising areas of applications for agent technology."

- online selling and buying
- automatic billing and payment services
- automatic ordering, contracting and procurement
- data mining of consumer information for customer profiling
- advertising of products and customization of advertisements
- electronic product catalogue
- electronic order tracking
- electronic funds transfer
- electronic "brand naming"

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What Is An Agent?

- Dictionary definitions:
  - A representative who acts on behalf of other persons or organizations
  - A businessman who buys or sells for another in exchange for a commission
- Software agents are
  - Autonomous
  - Personalized
  - Proactive
  - Adaptive
  - Communicative

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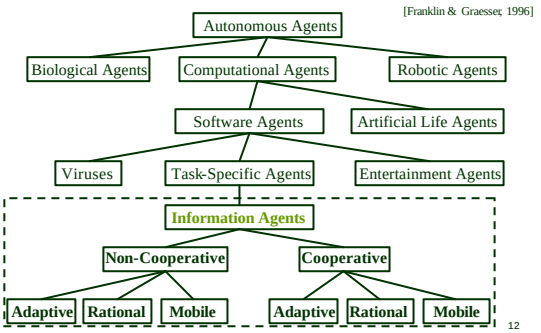
Intelligent Agents

[Franklin & Graesser, 1996]



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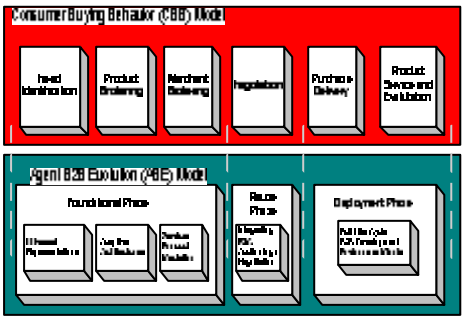
CBB Model (Pattie Maes, et al)



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Classification of Agents: Market View

processes of sales ⇒ categories for agents:

1. Demand Identification
   - Awareness of the need to buy
2. Product Brokering
   - What to buy
3. Merchant Brokering
   - Who to buy from
4. Negotiation
   - How much to pay
5. Purchase and Delivery
   - Payment and delivery options
6. Product Service and Evaluation

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E-Commerce Agents

- Personal shopping assistants
  - Price comparison
  - Compatibility
  - Purchase/warrantee information
- Distributed negotiation agents
- Auction Bots
- Stock Bots
- Recommendation and notification
- Agent-mediated electronic commerce

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Overview

- 1st generation agents
  - Filter information
  - Match people w/similar interests
  - Automate repetitive behavior
- 2nd generation
  - E-commerce ==> revolutionize
    - business-to-business
    - business-to-consumer
    - consumer-to-consumer

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Price-Comparison Shopping Agents

- **BargainFinder** was the first shopping agent for on-line price comparisons.
- Given a specific music CD, BargainFinder requests its price from each of nine different merchant Web sites using the same request as from a Web browser. BargainFinder then presents its results to the consumer.
- Like most of the first generation of e-commerce systems, BargainFinder do not exist anymore. However it offers valuable insights into the issues involved in product comparisons in the online world.
- Limited to comparing merchants offering only on price instead of their full range of value

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Excite's Jango

- Jango is similar to BargainFinder but with more product features to search across and more shopping categories.
  - Help user decide what to buy.
  - Finding specs and reviews of products.
  - Make recommendations.
  - Comparison shopping for best buy.
  - Monitoring "what's new" lists.
  - Watching for special offers & discounts.
- Jango solves the merchant blocking issue by having the product requests originating from each consumer's Web browser instead of a centralised site as in BargainFinder appear as requests from real customers

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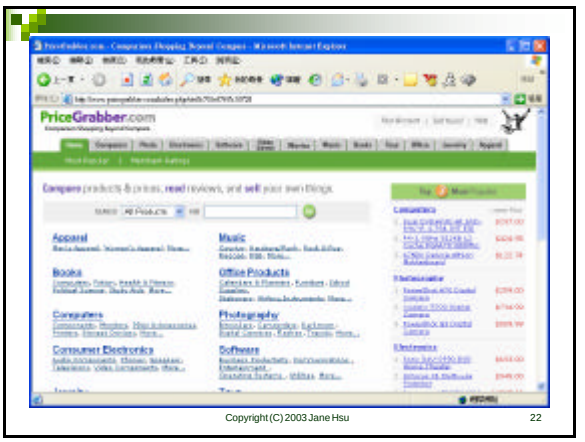

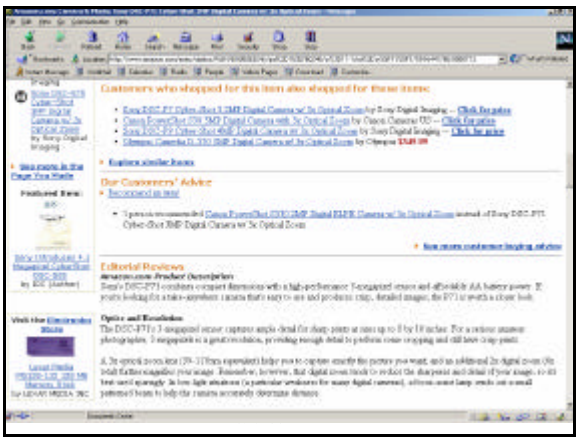

Example: MySimon

- Comparison shopping agent
  - User enters or chooses description of what they are looking for.
  - mySimon presents matches from merchant databases.
- Agent learns to search
  - Supposedly, agent learns how to retrieve desired information from merchant websites.
  - Non-programmers interact with system to teach it how to retrieve prices from new sites.

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Aristocart by Kanndu

- Conducting searches according to the criteria you specify.
- Automatically running price comparisons on the items you select, in order to find the best price.
- Constantly monitoring the Web to see whether prices have changed.
- Enabling you to make all your purchases, whether from one online store or many, using a single, two-click checkout procedure.
- Download Aristocart

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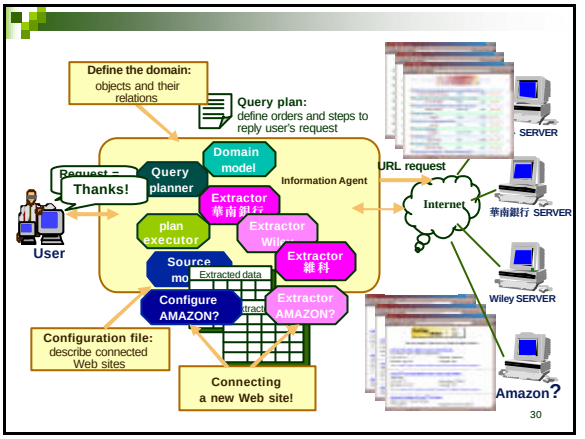
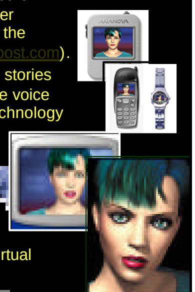


ANANOVA The World's First Virtual Newscaster (www.ananova.com)

- Developed by British Press Association and debuted on April 19 2000, Ananova is the first virtual newscaster in the world. She received 1.6M unique visitors in the first month and 2 marriage proposals (washingtonpost.com).
- Consisting of a search engine which collects latest stories from the web, a text-to-speech system to create the voice from the tagged information with live animation technology to create video (see how does she work here)
- An attempt to give personality on our interactions with machines and it will be the trend of future agents.
- More and more companies are going to roll out virtual characters, e.g. Mya from Motorola, Chase Walker from Sprint, though the Japanese virtual pop star Kyoko Date has failed.



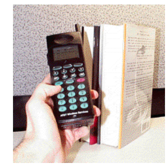
Presented by Samson W.S.Chan

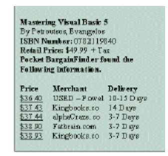
By: Samson Woon-shin Chan

Submitted: Jae-yeon

Agent in m-Commerce

- Pocket BargainFinder (1998)
  - http://www.ac.com/services/cstar/Projects/PocketBargainFinder.html
  - Anderson Consulting
  - augmented commerce: a convergence of electronic and physical commerce
  - the global scope of Internet shopping agents, the ease of input of a barcode scanner, and the portability of a PDA
  - BargainFinder (1995)
    - comparison shopping agent
    - information integration agent

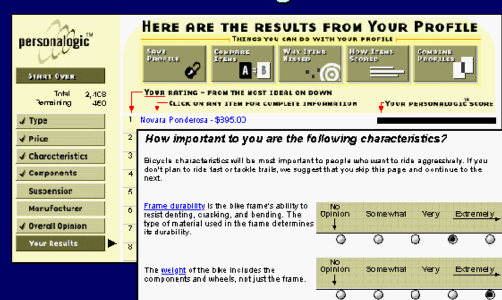




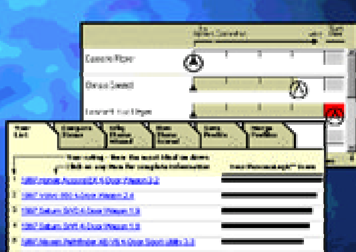
Product Brokering

- **PersonaLogic** is a tool that enables consumers to narrow down the products that best meet their needs by guiding them through a large product feature space.
- The system filters out unwanted products within a given domain by allowing shoppers to specify constraints on a product's features.
- A constraint satisfaction engine then returns an ordered list of only those products that satisfy all of the hard constraints.
- PersonLogic was acquired by AOL in 1998.

PersonaLogic



PersonaLogic (CSP)



Recommender Systems

- Content-based filtering
  - Collects information from various sources
  - Synthesizes information
- Collaborative filtering
  - Use information about other customers to recommend
- Constraint-based filtering
  - Special case of content-based
  - Optimization problem within constraints

Firefly

- Firefly services help consumers find products.
- Instead of filtering products based on features, Firely recommends products via a word of mouth recommendation mechanism called automated collaborative filtering (ACF).
- ACF first compares a shopper's product ratings with those of other shoppers. After identifying the shopper's nearest neighbors (i.e., users with similar tastes), ACF recommends products that they rated highly.
- Essentially, Firefly uses the opinions of like-minded people to offer recommendations.
- Firefly was acquired by Microsoft in 1998.

Collaborative Filtering

Basic calculations in collaborative filtering

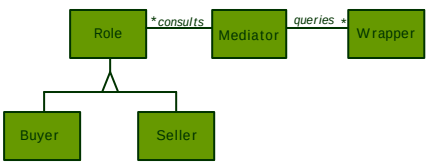
$$corr_{ab} = \frac{\sum_i (r_{ai} - \bar{r}_a)(r_{bi} - \bar{r}_b)}{\sqrt{\sum_i (r_{ai} - \bar{r}_a)^2 \sum_i (r_{bi} - \bar{r}_b)^2}}$$

$$cos(\vec{a}, \vec{b}) = \frac{\vec{a} \cdot \vec{b}}{\|\vec{a}\|_2 * \|\vec{b}\|_2}$$

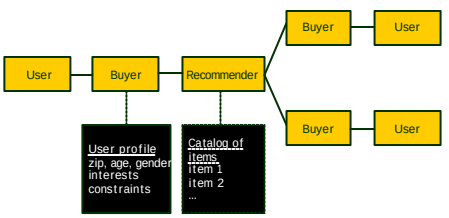
a – customer 1's preference vector

b – customer 2's preference vector

Agents As Mediators



Recommender Agents



MAS for E-Commerce

- Need for more efficient business practices in B2C
- Business extension and Maximize Profit along with Customer satisfaction
- A new advertising, promotion and purchasing medium
- Filtering, recommendation capabilities and consumer preferences

Auction Bots

- Goal: to develop a Web-based system
  - Agents can organize and/or participate in online auctions for goods
  - Users can create their own agents to buy and sell goods on their behalf
- User options:
  - Create a new buying agent
  - Create a new selling agent
  - See currently active agents
  - Create a new finding agent
  - Browse the marketplace for active agents

Case Study: Kasbah

- An Agent Marketplace for buying and selling goods.
  - Kasbah agents proactively seek out potential buyers or sellers and negotiate with them on behalf of their owners.
  - Each agent's goal is to complete an acceptable deal, subject to a set of user-specified constraints such as a desired price, a highest (or lowest) acceptable price, and a date by which to complete the transaction.
- Developed by MIT Media Lab in 1996
- Reinventing Classified Ads
- Helps to deal with information and work overload

Agent Description

- Agent Types
  - Buying agent
  - Selling agent
- Control parameters
  - Desired date to buy/sell by
  - Desired price
  - Lowest/Highest acceptable price
- Price raise/decay function
  - Linear
  - Quadratic
  - Cubic

Marketplace Description

- Facilitate negotiations between agents
- Ensure common language
- Matching agents
- Provide information about new agents
- Determine terminology(e.g. products)
- Agent independent

Kasbah: Prototype Implementation

- **accept-offer?**(agent, from-agent, offer)
- **what-is-price?**(agent, from-agent)
- **what-is-item?**(agent, from-agent)
- **add-potential-customers**(sell-agent, potential-customers)
- **add-potential-sellers**(buy-agent, potential-sellers)
- **remove-potential-sellers**(marketplace, agent)
- **remove-potential-customers**(marketplace, agent)
- **agent-terminated**(marketplace, agent)
- **deal-made**(marketplace, sell-agent, buy-agent, item, price)

Agent Negotiation

Negotiation is the process by which a group of agents communicate with one another to try and come to a mutually acceptable agreement on some matter

Negotiation: Basic Components

- **Negotiation Protocol**: Specifies the *rules of encounter* between the negotiation participants. The protocol defines the circumstances under which the interaction between the agents take place: *what deals can be made and what consequences of offers are allowed*

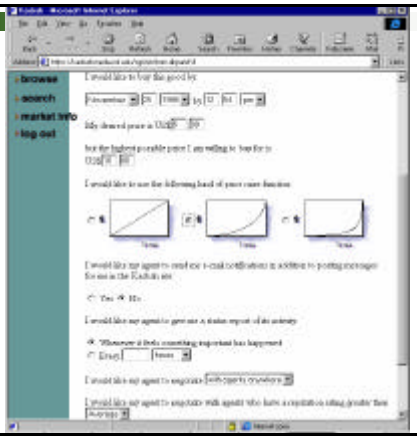
- **Negotiation Strategies**: Specification of the sequence of actions (*offers and counteroffers) the agent plans* to make during the negotiation.

Negotiation in Kasbah

- Negotiation protocol:
  - buying agents offer bids to sellers
  - selling agents respond with yes or no
- Determine the current asking price:
  - The agent lowers (increases) its asking price according to the specified price decay (raise) function.
  - When the agent is created, its asking price is set to the desired price. By the date to sell by, the asking price is the lowest price. At any moment in between, the current asking price can be interpolated according to the decay/raise function.

Negotiation in Kasbah

- Decide which agent to talk to.
  - The agent's strategy is to talk to each potential contact exactly once per round.
  - If a potential contact makes an offer to the agent, it is considered equivalent to the agent having talked to that contact during the current round.
- Talk to the potential contact.
  - The agent offers to sell (buy) the item at its current asking price.
  - If the contacted agent accepts, then the agent's job is done.
  - If the contacted agent rejects the offer, then it is asked what its offering price is. This price is recorded for that potential contact, and its asked-this-round flag is set to true.



Kasbah: Seller Agent

- Agent ID: 1 -- type sell
- agent created on: Wed 24 Jan 21:20:14 2002
- the control parameters:
- Sell by: Wed 24 Jan 21:24:00 2002
- Desired price: 100
- Lowest possible price: 50
- Price decay function: linear
- the item description: Ace of Spades

Kasbah: Buyer Agent I

- Agent ID: 2 -- type buy
- agent created on: Wed 24 Jan 21:20:14 2002
- the control parameters:
- Buy by: Wed 24 Jan 21:24:00 2002
- Desired price: 50
- Highest possible price: 85
- Price raise function: linear
- the item description: Ace of anything

Kasbah: Buyer Agent II

- Agent ID: 3 -- type buy
- agent created on: Wed 24 Jan 21:20:14 2002
- the control parameters:
- Buy by: Tue 24 Jan 21:25:00 2002
- Desired price: 70
- Highest possible price: 110
- Price raise function: linear
- the item description: Anything of Spades

Example: Selling with Kasbah

- Agents 1, 2, and 3 were added to the marketplace.
- The negotiation process runs for several cycles, each about twenty seconds apart.
- Eventually, Agent 3 agreed to buy the Ace of Spades from Agent 1 for a price of 79.

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Agents as Mediators in E-Commerce

	Excite Jango	Kasbah	Firefly	Personal Logic	Bargain Finder	eBay	Auction Bot
1. Need Identification							
2. Product Brokering	Y		Y	Y		Y	
3. Merchant Brokering	Y	Y			Y		
4. Negotiation		Y				Y	Y
5. Purchase and Delivery							
6. Product Service and Evaluation							

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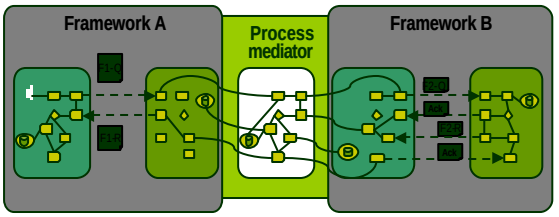
Process Mediation



- Describes how to align different conversational patterns
  - Follows both conversation specifications
  - Keeps track of both conversation contexts
  - Monitors and preserves the transaction boundaries

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Data mining

- Patterns in customer purchasing behavior
  - Help customers find products
- E.g., Engage

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Issues

- Presence
  - who is currently there?
- Awareness
  - where to look for similar users?
- History
  - when did an event happen?
- Personalization
  - how to learn users' preferences?
- Negotiation
  - how to enforce house rules?
- Privacy
  - how to protect users from prying eyes?
- Trust
  - how to create trust among strangers?
- Security
  - how to exchange data in safe ways

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Hype or Hope?

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