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PROFESSOR : George Widmeyer

STUDENT : Hao Wu

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An Analysis of Online Comparison Shopping

By
HaoWu
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Professor George Widmeyer, Faculty Supervisor

Faculty Comments

The potential for online shopping is often considered one of the most important aspects of electronic commerce because it can reduce the effort of comparison shopping. One problem with online shopping is actually finding items to compare. Online comparison shopping agents, or "bots" (from robots), are designed to solve this information search need. This paper does a good job of reviewing the development of comparison shopping online by analyzing current market offerings and projecting future development directions. It provides an assessment as of the end of 1999 that can serve as a starting point for future research in this area. The projections are based on current limitations and assumptions about functional requirements for shopping services. These projections are based on grounded speculation of current technology trends and possible changes in industry structure. The conclusions of this paper seem very reasonable and worth tracking.



George R. Widmeyer

Adjunct Associate Professor
Computer and Information Systems

INTRODUCTION

The explosive growth of the Internet prompts users' reliance on intermediary information processors. Although the Internet provides fast and easy access to information, its unprecedented vastness renders any human search online difficult.

This rapid Internet growth mostly comes from two areas - content providers and e-commerce. Internet users searching for information or shopping online both use search engines to locate relevant information sources or e-commerce sites. In fact, a study by Media Metrix in February 1999 indicated that the average work user spends 73 minutes per month at search engines, second only to 97 minutes at news, information and entertainment sites.

However, while Internet users can use search engines to find the actual information of interest (e.g., an article from New York Times), search engines cannot help shoppers locate desired products. Because of online information is mostly presented in text format, search engines can easily index the web pages and organize the information. On the contrary, products are buried deep inside an e-commerce site. Their descriptions also involve multiple variables such as brand, price, shipping options, availability, etc., which a typical search engine is incapable of organizing.

Online comparison shopping bots are designed to solve this information search need. Search engines index web pages to identify sources matching search queries, and then use ranking algorithm to organize these information based on relevancy. Similarly, shopping bots crawl e-commerce sites to locate products, parse the product information out of the web pages, and then organize the information in an easy-to-use manner.

This paper will review the development of the comparison shopping online, analyze current market offerings, and then attempt to project future development directions.

BACKGROUND

Online Comparison Shopping

The Internet promises to provide the ultimate shopping medium - easy access to online stores and quick comparison of product information. While offline retailers enjoy considerable impulse purchase from customers, online shoppers generally know what they are looking for. Jupiter Communications reported that 77% of online purchases are intended, while 14%, 6% and 3% are from browsing, impulse purchase and other factors.

Much like the offline shopping, shoppers who know what they want generally compare-shop online. The same Jupiter research found that 78% of online shoppers check at least two sites before purchase.

Online comparison shopping, broadly defined, covers many categories. Below is a table summarizing some of the web sites offering different comparison shopping services. The web sites offer comparison on price and other information. Links to the specific merchant sites are often provided once customers have made up purchase decisions.

Category	Web Sites
Travel	Travelocity, Preview Travel, LowestFare, Travelzoo, theTrip.com
Customer/Product Review	Bizrate, ConsumerReport, Productopia, Deja.com
Insurance	Insweb, Quicken InsureMarket
Restaurant	Zagat
Telecom services	Point.com , CellMania, WirelessAdvisor, decide.com , TalkingontheAir.com
Automobile	Autoweb, autobytel, Carpoint
Auction	Auctionwatch, Bidder's Edge, AuctionRover

This paper, however, does not focus on comparison shopping in the above categories. Travel comparison sites access a central booking database (e.g. Sabre) for pricing information. Auction comparison sites pooled data from different auction sites such as eBay, Yahoo! Auction and Amazon's Auction. The rest rely on human editing to compile pricing information. Instead, this paper will focus on online comparison web

sites that use shopping bots to automatically retrieve and organize information on merchandize products from other web sites.

Online Shopping Bots

Shopping agents, or bots (short for "robot"), automatically search for and compare product information on the web. They are the commercial application of intelligent agent technology - software programs that will automatically deliver what a network or database user is looking for - that has been a major focus of computer research for years¹².

There are two major types of shopping bots - catalog and "real-time". Both crawl the web sites, parse the product information out of the web pages, and organize the information in a manner easy for shoppers to compare. Catalog shopping bots crawl the specified e-commerce sites regularly and store product information in a local database. "Real-time" crawl web sites only when customers submit a query.

Online comparison shopping sites using shopping bots vouched to change customers' shopping behavior online by making comparison of product information, especially pricing, readily available. Nevertheless, since the first comparison shopping bot from Andersen Consulting in 1995, a major and widely-recognized comparison shopping site has not yet emerged. I believe the following factors are the reasons:

- Many online shoppers just came online recently. They are not aware of the pricing difference online, let alone the existence of price comparison sites.
- Some customers shopping online are not extremely price-sensitive. Instead, convenience and customer service are more important. Established e-tailers like Amazon and CDNow enjoy strong brand recognition.
- Early comparison shopping did not provide enough accurate information to help customers make purchase decisions. This problem still plagues many of the current comparison shopping sites, (see discussion below)

¹ Agents Go Price Shopping. Clinton Wilder. Intemetweek. Manhasset. Dec 7, 1998.

² Search Insider. David Green. Information World Review. Oxford. May 1999.

HISTORY

Andersen Consulting started online comparison shopping with its BargainFinder bot in 1995 to search for bargain-price CDs on the web. Interests in comparison shopping quickly caught on. Startups in this field believed that comparison shopping embodied the essence of the Internet - free and easy access to information and automated information organization for comparison. Below is a table listing all major comparison shopping sites.

Site	Launch Date	Major Events
BargainFinder	1995	Now defunct
Junglee	1996	Acquired by Amazon (1998)
Quando	*	Acquired by Infoseek (1998)
NetBot (Jango)	1997	Acquired by Excite (1997)
C2B	*	Acquired by Inktomi (1998)
Shopper.com	*	Acquired by C/NET (1998)
CompareNet	*	Acquired by Microsoft MSN (3/99)
KillerApp	*	Acquired by C/NET (1999)
Cadabra	1997	Acquired by Goto (1999)
LiquidMarket	*	Acquired by Xoom (8/99)
BottomDollar	1997	
Acess	1997	Bertlesman minority investment (1998)
DealTime	1997	\$25mm marketing campaign (11/99)
MySimon	1998	\$20 mm marketing campaign (1999)
PriceScan	1998	
Frictionless Commerce	1998	Licensed by Lycos
RUSure	1999	

* Information no longer available after acquisition.

Earlier shopping bots received wide press coverage in mid-1998 when major portal sites and Amazon acquired the most successful players. Acquisition by portals promised great strategic advantages to both - Portals got a chance to diversify their service offerings, while shopping bots could access the huge traffic visiting portals. Currently, all major portals have a shopping bot, with Yahoo! and AltaVista having developed their own.

However, after the acquisition fanfare, comparison shopping saw its popularity sliding among online shoppers. Shopping bots were usually buried deep down in the

portal site, which made it difficult for users to access. In addition, later development of merchants' pay-for-placement at portal sites compromised shopping bots' impartiality. Because of their revenue model, portal sites have stronger incentives to promote paying merchants than to provide "neutral" merchandise information to their users.

More importantly, technological inadequacies impaired the adoption of shopping bots among online shoppers. These first generation bots often returned inadequate and poorly organized information which did not help shopper much in reaching purchase decisions. Merchant coverage was low, affecting both the number of products and pricing difference searchable. On pricing, bots only searched for product price, ignoring hidden costs such as shipping & handling costs and taxes. Shoppers could not receive information on product availability either. Poor linkages to merchants meant that shoppers had to navigate the whole merchant site to complete a transaction.

In the meantime, merchants also opposed the growth of online shopping bots by blocking their access. They feared that these bots would further intensify the price competition online. They also argued, rightly, that shopping bots only searched for pricing information which was not enough to represent a merchant's service offerings including S&H and customer service. In addition, early web spidering technology of the shopping bots would hit merchant site with many simultaneous queries each time, causing the merchant servers to slow or even break down.

CURRENT MARKET AND DEVELOPMENT

More acquisition and VC investment in online comparison shopping sites in 1999 signaled a reviving interest in online comparison shopping. Because of its low technology barrier, many new comparison shopping sites also entered this area with new shopping bots and tried to avoid the mistakes of earlier bots. Currently, Yahoo! lists 25 sites offering comparison shopping in multiple product categories, 15 extra sites specializing in computer comparison shopping and 12 more in books. This section will analyze the drivers behind this new growth.

Market Condition

The mass acceptance of e-commerce surely helps comparison shopping sites prove its relevance. Many experts regard the 1998 Christmas shopping season as the unofficial birthday of large-scale B2C e-commerce. That shopping season dramatically increased consumers' awareness of e-commerce and the many merchants online. More shoppers online provide more price-sensitive shoppers, the natural customers of shopping bots. It also means a greater need for shoppers to rely on shopping bots to help navigate through the different merchant sites, finding the product and compare shopping.

Merchant Acceptance

The revival can also be attributed to greater merchant acceptance of shopping bots. Today, very few merchant sites block queries from shopping bots anymore. This warming relationship was due to the following reasons.

- 1) Shopping bots have become more commonplace.

The slowly building awareness of comparison shopping online has eased the initial knee-jerk reactions of online merchants. Presently, all portal sites have either internally-developed or acquired shopping bots. Inktomi, the premier search and shopping service provider, licensed its shopping bot to prominent web sites such as

GeoCities and Cnnfn. Merchants recognized that there is no point opposing shopping bots as comparison shopping happens and will eventually prevail on the web.

2) Shopping bots have directed quality traffic to merchant sites.

The intense competition among online merchants increased the urgency for online merchants to attract and retain customers. Shopping bots not only direct traffic to merchants, but they also direct high-conversion traffic that is motivated to buy and often turn their searches into sales³. According to MySimon, 60% of its users click through to merchant stores⁴.

After shoppers reach merchants' web sites, merchants have realized that it is their job to turn these shoppers into repeat customers by providing superior customer services. Many have recognized that they do not want the kind of customers who buy solely on price anyway. Consequently, merchants view comparison shopping sites as a source for new customers, not a bargain basement to divert existing customers away.

3) Shopping bots are more cooperative with merchants

The early strained relationship between shopping bots and merchants also taught comparison shopping sites that self-regulation and good behavior is the key to receive cooperation from merchants⁵. New bots provide information beyond basic pricing (see discussion below) to address merchants' fear of brand erosion. They also redesigned their search process to avoid overloading merchant sites and slowing down traffic.

Previously, if a bot wanted to search a merchant's product catalog, it would crawl the entire database each time when a query is submitted for real-time bots or during the frequent information updates for catalog bots. Now, bots run smarter and efficiently, e.g., providing a caching mechanism to store frequently searched information. They also

³ Call Your Agent for OnlineShopping. Clinton Wilder. Informationweek; Manhasset; Dec 7, 1998.

⁴ Revenge of the Bots. Karen Solomon. TheStandard.com. <http://www.thestandard.com/article/display/0,1151,7624,00.html>

⁵ Revenge of the Bots. Karen Solomon. TheStandard.com. <http://www.thestandard.com/article/display/0,1151,7624,00.html>

gather data more responsibly. For example, they search during off-hours, refresh information less frequently, or practice slow download of data.

Product Improvement

New bots also dramatically improved their service offerings to increase shopper satisfaction. Specifically, I view the following as major improvement over earlier comparison sites.

- Multiple-product-category comparison shopping sites organize different products under easy-to-navigate directories.
- For each product category, shopping bots increased merchant coverage to provide meaningful comparison. The abundant e-commerce sites available online makes this expansion possible.
- Shopping bots offer more comprehensive product information. Besides basic product prices, shopping bots also provide shipping costs, delivery time, availability and ratings on merchants' customer service level.
- Real-time queries or frequent catalog updates improve the information accuracy.
- New shopping bots organize information much better, offering easier comparison for users.

All of the above factors favor the emergence of shopping bots as a powerful shopping tool. MySimon and DealTime, leading comparison shopping sites, both announced more than \$20 mm of marketing campaign before the start of the 1999 holiday shopping season. Nielsen/NetRatings reported on December 3, 1999, that traffic to web sites offering comparison shopping services jumped 71% during the first week of Christmas shopping season, compared to the 11% increase of online shopping in general. Year 2000 may be the breakthrough year for online comparison shopping through both marketing and product improvement.

FUTURE DEVELOPMENT

Online shopping bots have the potential to be indispensable to online shoppers as search engines are to web surfers. As more and more merchants get online everyday, future shopping bots will be an important tool for shoppers to navigate and compare product information to make purchase decisions. This section will summarize the author's thinking on the future developments of shopping bots.

Re-definition of shopping bots

Shopping bots are defined as software programs that search and compare product information online. However, in reality, many people use automated price comparison as a working definition. Consequently, most of recent improvements focused on accuracy of pricing information. I would argue that this working definition is inadequate for the following reasons.

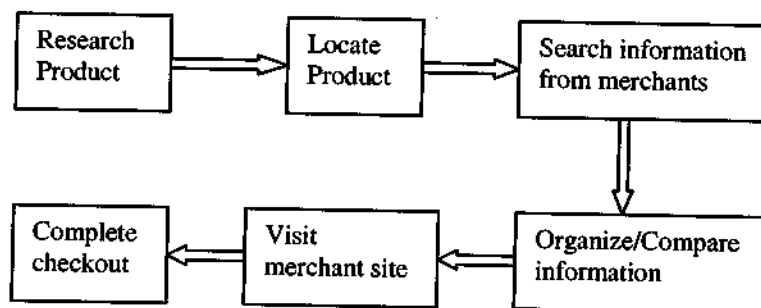
- Price comparison does not address the concerns of all shoppers. Comparison shopping sites like to cite the Juniper research showing that 78% of online shoppers check at least two sites before buying. They argue that this demonstrates the potential of automated price comparison. However, not all of these shoppers are price-sensitive. The information they compare shop online is not exclusively pricing. Availability, shipping time and merchant's reputation can be as important.
- Price comparison does not apply to experience products. Experience products, as defined by Rajiv Lai and Miklos Sarvary from the Standard Business School, are items that shoppers prefer to see and touch before purchasing⁶. These products enjoy a high degree of brand and merchant loyalty among shoppers. Current comparison shopping focuses on commodity products which shoppers do not have to see in person before purchasing.
- Price comparison does not encourage browsing or impulse buying. Although browsing and impulse buying only constitutes 14% and 6% of current online

shopping, respectively, I would argue that these two buying methods will increase as shoppers become more and more comfortable shopping online. One reason that online mega-stores such as Amazon and eToys are so popular is because they support easy browsing and encourage impulse buying.

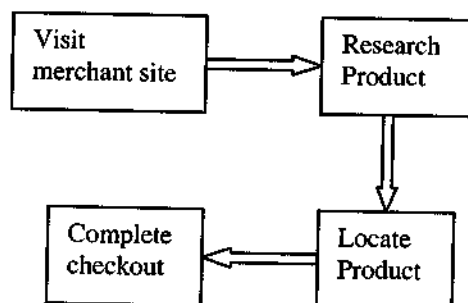
Instead, I would redefine shopping bots as automated shopping agents that facilitate shoppers to locate product, search for production information, organize this information for easy comparison, and complete checkout process after purchase decision. Shopping bots based on this definition will enable comparison shopping sites to act as the shopping search portal, as Yahoo! is to the content searchers.

This redefinition is necessary to address the shortcomings of the current price-comparison working definition as discussed above. It is also necessary to shield comparison shopping sites from competitions from established online merchants, portals and online malls.

Online Shopping with Shopping Bots

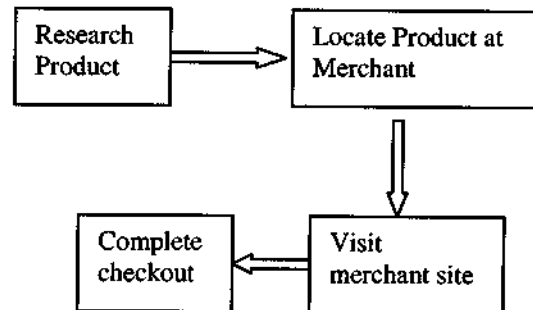


Online Shopping with etailers



⁶ Electronic Commerce: A New Take on Web Shopping. John Landry. Harvard Business review. Boston. Jul/Aug 1998.

Online Shopping with Portals/eMalls



As illustrated in the diagrams above, the shopping experience with shopping bots is different from shopping at online merchants, portals or online malls. Since etailers, portals and online malls all provide complete shopper experience within the sites, comparison shopping sites should also make shopping bots an intelligent agent helping shoppers along the entire shopping experience.

Current Limitations

The major drawback of current comparison shopping sites is that they do not provide the full shopping companion service as discussed above. Providing partial service will leave shoppers unsatisfied and allow competitors, especially etailers, convert shoppers with easy-to-use services. Specifically, shopping bots failed in the following steps along the shopping experience flow.

- **Search Products:** Very few comparison shopping sites offer product research or recommendation to allow shoppers to browse.
- **Locate Products:** Except for books which have a catalog service based on ISBNs, few of the other products sold online allow easy location of desired products. Unless the merchants covered by shopping bots carry the products in their inventories, shoppers will not be able to find the products through shopping bots, even when they know the products exist. Only comparison shopping leaders such as MySimon, PriceScan and BottomDollar have achieved the scale of economics to have sizable virtual product

database. However, even theirs are not close to the inventory database of online merchants like Amazon.

- **Search and Compare Information:** Although new shopping bots provide much more comprehensive information than the older ones, many bots are still not performing up to expectation. The scale issue of merchant coverage undermines the information available for search and comparison. Other imperfections include lacking information on merchants' customer service level as well as inaccuracy of information provided.
- **Merchant Visit and Checkout:** Current shopping bots direct shoppers to the respective merchant sites after comparison of information. Even when the links directly take shoppers to the checkout pages, the ensuing checkout process is still frustrating. Most major retailers now offer one-click checkout that has helped them retain customers.

Future Development

I see the following trends in the future development of comparison shopping. First, industry consolidation will occur and only a few comparison shopping sites will stay as dominant players. At present there are too many comparison shopping sites competing for traffic. Industry consolidation will not only allow merging partners to share traffic, but it will also help achieve the scale of economics - merchants and products covered - that is necessary to compete effectively with established retailers and portals.

Second, we will see more partnerships between comparison shopping sites and other service/content providers. I discussed above about current shopping bots' limitations in providing product search and merchant customer-service-level information. The former helps shoppers determine which product to buy, the later where to buy the product.

Partnership is best for comparison shopping sites to develop and integrate these contents, as time-to-market is crucial in today's competition on the Internet. MySimon is

already partnering with Productopia and ActiveResearch to provide product and merchant information. In the future, we will see more partnerships with consumer rating and merchant review sites such as Bizrate, Deja.com and ConsumerReport.

Partnership will also help shopping bots streamline the entire shopping experience for consumers. For example, the emerging e-wallet technology will enable one-click form-filling or checkout at many different merchant sites. By partnering with e-wallet technology providers, shopping bots will give shoppers the checkout convenience similar to the one-click checkout at major retailers.

Third, existing comparison shopping sites will continue to improve their service offerings to stay in the competition. Improvement will happen in three areas:

- **Economies of Scale:** Shopping bots will compete to cover the most merchants and the most product categories. For commodity products, the winners will have better information search and comparison capabilities. For experience products, these bots will act as personal shoppers to locate the products online.
- **Vertical Integration:** As discussed above, comparison shopping sites need to integrate content (e.g., product information and merchant ratings) and purchase facilitation (e.g., one-click checkout) to provide complete purchase service to users. It is much easier to accomplish these two with partnerships.

However, even with partnerships, achieving economics of scale and vertical integration will not be an easy task. Consequently, I believe that comparison shopping sites currently focusing on limited product categories, e.g., book only, still have a chance to effectively compete with leaders such as MySimon and PriceScan. They can better manage vertical integration of content and checkout coordination, mainly because of their limited product and merchant coverage. Alliances with other “niche” players in comparison shopping will provide them with the necessary scale of economies.

Fourth, the future shopping bots will be more intelligent. Artificial intelligence will make the bots smarter in searching and organizing information. It will also enable the bots to make purchase recommendations. Frictionless Commerce, incubated in the

MIT Media Lab, is already experimenting with product recommendation based on shopper profile and the purchase history of other shoppers with similar profiles.

Fifth, the developments of portals, online malls and comparison shopping sites will likely converge in the future. Portals already offer comparison shopping. Online malls have the scale of merchant coverage and only need to link their product catalog together. However, portals' reliance on ad revenue from merchant placement will limit their aggressiveness in promoting comparison shopping. Online malls will have similar resistance from their merchants.

On the other hand, comparison shopping sites are following the examples of portals and online malls to provide preferential placement in exchange for merchant payments. This occurred because not all merchants are willing to give shopping bots a cut of the transaction revenue. With increasing vertical integration, comparison shopping sites will look more like shopping portal sites in the future where shoppers can complete the entire shopping experience.

Sixth, technology development will make comparison shopping easier and more accurate. One of the most promising is the development of XML, Extensible Markup Language. XML promises to facilitate exchange of any information online.

The big advantage of XML over HTML (the most popular language to encode web pages) is its meaningful structure and semantics that computers can readily understand. Meanwhile, HTML is format-oriented and not semantically encoded, which requires software engineers to use proprietary tags or software to extract information from the web pages. This ad hoc approach severely limits the scalability of information extraction and comparison.

Many experts have predicted that XML will fundamentally transform the nature of e-commerce. By making the web accessible to agents and other automated processes, XML will eliminate the need for custom interfaces with every web site,

⁷ An XML Framework for Agent-based E-commerce. Robert Glushko et al. Association for Computing Machinery. Communications of the ACM. New York. March 1999.

⁸ Agents That Buy and Sell. Maes et al. Association for Computing Machinery. Communications of the ACM. New York. March 1999.

allowing easy comparison of products and contents across many vendors/content providers and catalog/content format.

However, XML will probably prevail first in other agent-based e-commerce than in comparison shopping. XML will make it very easy for consumers to compare shop and competitors to co-opt the catalog content. Merchants' fear of lost business opportunity will impede the implementation of XML. In addition, XML encoding is more difficult than HTML. Merchants will not want to change their web page coding until it is absolute necessary.

The likely scenario will see XML succeeding among content providers and Business-to-Business e-commerce (e.g., intranet, B2B supply chain and distribution management). Once XML achieves the network externality of popularity to take over HTML as the primary web page coding language, we will see online merchants' adoption of XML and the subsequent emergence of truly robust and accurate shopping bots.

CONCLUSION

Online shopping has been projected to change the notion of brand online. Many argued that since it is so easy to shop at another merchant site and compare prices, e-commerce would bring intense price competition online and the demise of the brand and customer loyalty. They also argued that comparison shopping bots online would quickly become popular, further facilitating this process.

So far, the development of e-commerce has not been as predicted. The new online retailing industry is still struggling with unsatisfying customer service. As a result, most online shoppers, many new to the web, are rushing to retailers with established brand names online.

The development of shopping bots has been a bit disappointing as well. However, both the market and the technology are ready for shopping bots to improve their services. As discussed in the paper, I believe that online comparison shopping sites can significantly attract and retain users by increasing economies of scale and integrating vertically.

The future success of online comparison shopping will truly erode the significance of brand online. Traditionally, the importance of brand represents the costs associated with information search in the purchase process. Branded products or merchants can charge a price premium partly because shoppers do not want to shoulder this information search costs.

In the offline world, publications such as Consumer Report work against brand by comparing existing brands. In the online world, shopping bots will provide more and better-organized information, not only pricing information to price-sensitive shoppers, but also product information, product review and merchant review to all shoppers. With this information available, shoppers can make truly informed purchase decisions, which undercuts the influence of brand. In summary, the future intelligent shopping bots will ultimately empower consumers, giving them the freedom to choose the best deals online.