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Wednesday, March 28, 2007

Mining for Cheap Flights

Farecast claims to offer cheap tickets based on science, not marketing.

By Kate Greene

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Visualizing cheap fares:
Farecast's software inspects the price history of flights and helps consumers determine when to buy

their tickets and where they can fly inexpensively. The top plot shows the history of a given flight. The bottom graphic shows the lowest-priced flights from Seattle.
Credit: Farecast

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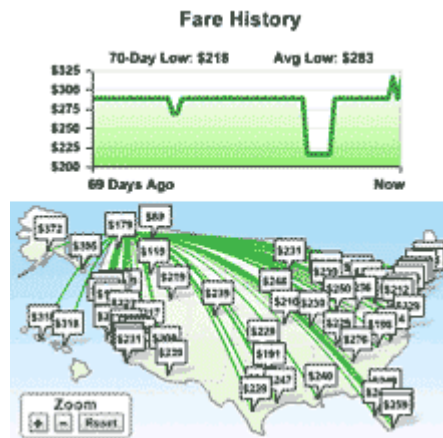- [Cheaper Natural Gas from Coal](#)
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On a flight to his brother's wedding in 2001, [Oren Etzioni](#) discovered that the people sitting next to him had bought their tickets later than he did, yet had paid less. For some, this could have been an infuriating revelation, but Etzioni didn't get mad; as a professor of computer science and engineering at the University of Washington, in Seattle, he got inspired. "I thought, 'Why don't I collect historical data [on airfares] and use that to anticipate ticket prices?'"

In 2003, Etzioni and colleagues published a paper showing that they could predict the fluctuation in airline-ticket prices surprisingly well. By sifting through the history of more than 12,000 airfares for nonstop flights from Seattle to Washington, D.C., and from Los Angeles to Boston, the researchers could predict with 62 percent accuracy whether or not those ticket prices would rise or fall in the future. That same year, using the principles behind that research, Etzioni founded [Farecast](#), a website--available to the public in 2006--that advises a visitor whether to buy a given ticket immediately or wait to get a better deal. Earlier this month, the company added a new feature to the site that unearths deals for weekend escapes, family getaways, last-minute excursions, and other types of trips.
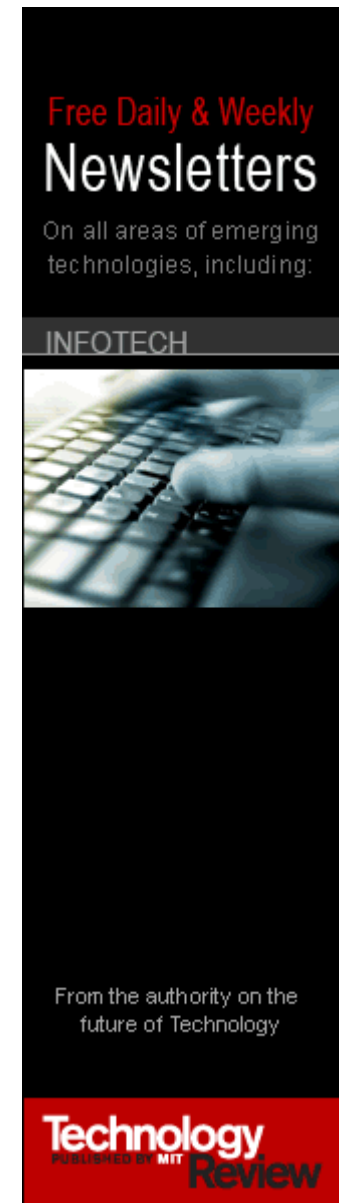
Anyone who has made travel arrangements online knows how quickly airfares can change. Etzioni's early research revealed that a ticket price can change as many as seven times a day, depending on the prices of similar flights from competing companies and on such factors as seat availability on the flight in question. The capricious and opaque nature of airfare has inspired other entrepreneurs to start companies that try to help consumers make the most economical decisions. FareCompare tracks airline sales and promotions that fall in line with a user's preset constraints. Another site, called Kayak, displays the best ticket prices found by Kayak users over a two-day period.

Farecast differs from these companies by using sophisticated algorithms to mine enormous data sets of more than 175 billion airfares from around the country. This data is collected by Boston-based ITA Software, a company that works with airlines and travel sites such as Hotwire and Orbitz to help with pricing and reservations. Farecast's data-mining algorithms look for trends in the prices and help determine the impact on prices of variables such as seasonal changes, conventions, and college graduations. But humans also play an important role in analysis, explains Etzioni. Farecast's engineers look at the data using specialized visualization software--collections of plots and graphs that can show multiple variables and changes over time. "Our variables can be quite complex, and we use the human eye and highly evolved visual cortex to discern patterns," Etzioni says. Sometimes, a trend or anomalous variable will be subtle and missed by a computer, he says, but when displayed graphically, it can be caught by a person.

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The patterns, variables, and trends that are collected from the price data are then used to make predictions on future flights. So, when a person goes to Farecast.com and submits trip information--departing and arriving cities, dates, and number of passengers--the company's software predicts whether it's a good time to buy a ticket. For instance, a flight from San Francisco to Kansas City, MO, will cost about $395 if bought now, but Farecast predicts that the price will drop about $50 within the next seven days and recommends waiting to buy. However, a user still has an option to buy a ticket through Farecast immediately. In addition to employing the ticket-buying tip, a user can refine her search in a way that's similar to how Expedia and Orbitz refine searches: by time of day, airline, and number of stops.

When Farecast predicts a price, it also determines a confidence level--a measure of how accurate the system deems a given result is. These levels vary, says Etzioni, from 60 to 90 percent, and they are based on performance of past predictions for similar routes and conditions. "Farecast is constantly scoring itself," he says. Based on Farecast's self-reported track record, the accuracy of past predictions ranges from 70 to 75 percent. This is good enough to prompt the company to sell, for

$9.95, a guarantee that can be used when someone purchases a ticket. If the price drops when Farecast predicted that it would stay the same or rise, the company will compensate the customer.

Farecast's new feature, called Farecast Deals, uses the same pricing data that is collected for fare prediction, but it filters it in a way that mimics popular flight searches, such as last-minute weekend trips. Farecast Deals lets a user know if the ticket price for the deal will rise and how long it will be before the price will go down again, according to predictions.

"What's great about Farecast is that it provides you with a sense of perspective and takes steps to remove uncertainty," says Henry Harteveldt, vice president and principal analyst in travel research for Forrester Research, a technology analysis firm.

So far, Farecast has garnered a lot of positive attention from analysts and bloggers, including Michael Arrington of the popular blog Techcrunch. Arrington recently said that the company is "turning into quite a nice way to find cheap airline tickets."

As Farecast continues to collect more data about price history and evaluate its own predictions, its confidence level will improve, says Etzioni, although it will never reach 100 percent. The company expects to expand to offer deals on hotel rooms and car rentals, as these industries price inventory in a manner similar to the way airlines do.

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