ECONOMICS

Creating interfaces for experimental economics simulations
University of Michigan

An economist often tests theories about people's behavior in strategic interactions like bargaining, auctioning, and negotiating. Typically, using a network of computers in a controlled environment, the economist observes how people behave when asked to make a series of strategic decisions.

Using NeXT computers, Hal Varian, professor of economics and ®nance at the University of Michigan, is studying people's behavior as they play his adaptation of the well-known computer simulation, Prisoner's Dilemma. The two-person game is played over a network and simulates how people behave in bargaining situations. In Prisoner's Dilemma, players do best at the game if they cooperate. However, each is tempted to defect from the cooperative solution. Varian allows the players to communicate over the computer network and then studies how this opportunity to negotiate affects the outcome of the game.

Varian says the biggest problem in developing these experimental economics simulations is designing an easy-to-use interface at an affordable cost.

ªIt is important to have an intuitive interface,º says Varian, ªsince the subjects have to learn to play the game in a short period of time. Furthermore, the interface should be fun to use. An attractive visual interface makes people interested in the game and encourages them to play to win.º

He found that developing such interfaces by ªconventional methods was costly and time-consuming.º Varian says his productivity was signi®cantly enhanced once he started working on the NeXT platform.

ªWith Interface Builder, development time has been signi®cantly reduced. Plus, the object-oriented design of the NeXT machine encourages reusability. Although each experiment is run only a few times, each experiment has many features in common with the others. Having a tool kit of objects for such games and simulations has proved very useful in subsequent research projects.º

Varian adds that these simulations are useful not only in research, but in teaching as well. ªEconomic concepts become much more vivid when students can get hands-on experience,º he says. ªThe NeXT platform provides a convenient platform for this type of experimentation.º

In the future, he plans to develop simulations of market games, auctions, and bargaining, for use in both teaching and research.

Varian also recently published a new edition of his graduate economics text, *Microeconomic Analysis*, using TEX software on his NeXT.

ªThe integrated environment offered by NeXT makes the author's job much easier,º he says. ªAll the tools necessary for producing professional technical publications using TEX come bundled with NeXT machinesÐand all the tools work very well together.º

To supplement the text, Varian has developed 25 *Mathematica* Notebooks that illustrate the principles involved in applying mathematical models to economic problems. The Notebooks contain lessons on optimization, sensitivity analysis, optimal pricing schemes, econometrics, and cost-bene®t analysis.

ªIt's terri®c that *Mathematica* comes bundled with the NeXT,º says Varian. ªNeXT has the best implementation of *Mathematica* and also the Notebook front-end. *Mathematica* runs on many platforms, but the NeXT is the easiest to use and the most cost-effective platform I know of.º

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