Professor John McCarthy Father of AI

Articles

Teleservice

A discussion of the potential for robotics to allow workers in developing nations to provide services in richer nations.

Teleservice

This file is Tue Jan 14 22:46:37 1997 about 1/2 done.

Workers in poor countries can remotely operate robots in rich countries to the benefit of the workers in the poor countries and the people in rich countries who employ them. If the general economic policies of the poor countries are good, this will speed up development of the poor countries and eventually equalize wages. Here are some relevant facts.

1. Millions of people from poor countries take jobs in rich countries. Some migrate legally as permanent residents. Others come under arrangements that are nominally temporary, i.e. they are expected to work for a while and eventually return home. There is substantial illegal migration. Employers in rich countries can get people from poor countries to work for wages which are lower than those required by citizens but are higher than the workers can get in their home countries. Besides business employers, there are large numbers of private individuals employing foreign domestic workers.

2. Every rich country puts restrictions on the number of immigrants from poor countries. Immigrants can become burdens on the welfare system, and if they bring their families, the families become burdens.

3. The present state of robotics is not up to doing many operations now done by people that cost much less in poor countries. Examples include barbering and domestic service. Current robots can carry trays around and not a lot more. The problem is mainly the programming rather than the hardware.

4. The cost of international communication is now such that TV images adequate for doing many manual tasks remotely can be transmitted for a lot less than the cost of the service itself.

5. The ratio of wages in many occupations between rich and poor countries is large enough to sustain a lot of overhead.

6. Unless something surprising happens, China and India will sustain the low wage business for a very long time.

7. A current active area of research is remote surgery. In this case, the object is to magnify the efforts of an expert by allowing him to do surgery without travelling to the patient. There are some extra possibilities; the remote tool need not correspond exactly to the surgeon's hands. Professor Jon Bowersox at Stanford has a project on telesurgery supported by DARPA.

The Technology of Remote Service

The problem has three aspects.

Communication
: Satellite communication may impose excessive control delays for fine work, especially if two satellites are involved. This is because communication satellites in geostationary orbits are 22,000 miles from the earth. With two satellites that is 88,000 miles, and a back and forth is 176,000 miles, which is almost a second at the speed of light. Fortunately, fiber optic cables are becoming the main method of intecontinental communication. For them, the delays are much smaller. The price of the intercontinental communication bandwith will be inserted here as soon as the numbers can be obtained.

TV transmission and compression

: It may be that the costs are low enough so that a full two-way TV channel is quite cheap. Otherwise, there are many possible bandwidth saving schemes, and these will depend on the application. For example, much of the scene remains unchanged as the remotely controlled robot moves. Evidently much of the relative positions of parts of the customer's head remains unchanged during barbering. It has recently been announced that TV can be transmitted over a 28.8kb modem.

Mechanical

: Robots suitable in their mechanical properties for barbering and house cleaning may not exist yet, but they seem to be within the state of the art of mechanical engineering. To be widely usable, a house cleaning robot should not weigh more than a person.

Program assistance

: AI seems to be slow in developing robots that can do these jobs all by themselves. However, it is good enough to do parts of them and thereby enhance the efforts of the human worker. Gradually, more and more of the control will be robotic.

Social Effects

Consider the effects of remote service on two occupations - barbering and domestic service.

Barbering

A barber in Bangladesh cuts just as much hair per day as a barber in the U.S. - maybe more, since his hours may be longer. Very likely he is just as skillful. Economists give barbering as an example of an occupation that cannot be exported and therefore commands wages determined by the productivity of other occupations in the same country. Economists were mistaken in believing that barbering could not be exported.

In 1987 American barber and beauty shops had 390,000 employees. The large scale use of foreign based teleservice might reduce this to less than half, perhaps to less than 1/10. It would depend on the development of very specialized services and on the need for supervisers of the foreign operations.

Barbering is a rather stable profession, and barbers in the developed world would resist being displaced. When linotype operators were displaced, there were employers who could be induced to buy out the jobs. This is not the case for barbers. Probably the Government would make it easy for them in some way, perhaps by a temporary tax on remote barbering. For these social reasons, maybe the displacement of barbers will be slow or long delayed.

Domestic Service

Domestic service is less problematical socially than barbering. Everyone gets haircuts, so the main effect of remoter barbering will be to displace current barbers. The largest effect of remote domestic service would be that people who currently can't afford domestic service would hire remote workers.

The overall effect of teleservice will be to gradually equalize world working conditions and living standards, mainly by bring up the standards in the less developed world. This is the same effect that moving manufacturing to the underdeveloped world is having. Eventually, Chinese barbers and domestic workers will be paid as much as Americans, but this will only happen through development of the Chinese economy in all its sectors. Because of the enormous populations of China and the Indian subcontinent, they will remain reservoirs of inexpensive labor for a long time.

While we wait for an economist to show up, let's try some numbers.

There are 5.6 billion people in the world. From 300 million to 600 million families could afford domestic service at Chinese, Indian, Indonesian, Vietnamese or African wage rates.

Probably there are 1.0 to 1.5 billion people who would take remote service jobs if offered. There is great underemployment in low wage countries. Howeve, the reservoir of potential service employees is not that large, because the remote service labor market would put money into the economies of these poor countries and this money would be used to buy goods and services that would employ more people. Perhaps the actual labor supply is more like 500 million. If so, this is a several trillion dollar industry.

As the labor supply was used up, especially in countries with substantial English (or French) speaking native populations, wages would go up. Also the economies of these backward countries would grow faster than they are presently growing. Eventually, the number of remote workers would decline. My guess is that this would take 20 to 30 years. Perhaps we can estimate this from the time to took for the servant class in England to drop by a factor of three.

Top | John McCarthy's Original Website [http://www-formal.stanford.edu/jmc/] | We invite you to send comments and feedback [mailto:ProjectJMC@TheMagicLab.org]