Cambridge International Examinations
Cambridge Pre-U Certificate

GLOBAL PERSPECTIVES (SHORT COURSE)   **1340/01**

Paper 1   Written paper   **May/June 2015**
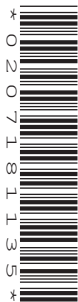
1 hour 30 minutes

RESOURCE BOOKLET

READ THESE INSTRUCTIONS FIRST

This Resource Booklet contains Documents 1 and 2 which you should use to answer the questions.

You should spend approximately 10 minutes reading the documents before attempting to answer the questions. This is allowed for within the time set for the examination.

This document consists of **3** printed pages and **1** blank page.

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The documents below consider the issue of Artificial Intelligence. Read them **both** in order to answer **all** the questions on the question paper.

Document 1: adapted from *Artificial Intelligence (AI) Means More Than Just Neat Gadgets – It Will Mean a Greener Future for Everyone* by Dr. Alex Rogers. The author is a lecturer in a UK university. This article was published online in 2013.

Despite a number of early disappointments, Artificial Intelligence (AI) is finally beginning to deliver on some of its early promise. In the 1950s, predictions of thinking machines with human level intelligence within the next twenty years were common. Unfortunately, it's taken a lot longer than that, and such human level intelligence is still some way off.

However, the growth of computer power over the same period has meant that the devices and services that we use every day are now routinely tackling many of the early challenges of AI. Our cameras and smart phones locate faces in images and focus accordingly. Social networking websites recognize our friends in these same images and automatically tag them. Our cars can already park themselves and automatically brake when they recognize pedestrians stepping into the road, and self-driving cars are clocking up miles on real roads. Meanwhile, closer to that original vision of human level intelligence, last year 'Watson', a supercomputer built by IBM, famously beat human players on the quiz show 'Jeopardy!', and is now being re-tasked to train medical doctors.

Despite this progress, one area where there has been very little deployment of AI technologies is in our homes. Like AI itself, the vision of a smart home, full of devices that learn what we want and automatically take care of household chores still seems to many like science fiction.

However, new concerns about ever rising energy costs, and the impact of carbon emissions from domestic energy use on climate change, are beginning to change this. Last year, a Learning Thermostat was introduced, with smart technology that learns the householders' preferences, and automatically recognizes when the home is unoccupied, and adjusts the heating or cooling system appropriately.

The Electronics and Computer Science department where I work, one of the world's largest and most successful electronics and computer science departments, can tackle Artificial Intelligence challenges. Our system, named MyJoulo, aims to reduce your heating bill by providing personalised advice on your home's energy consumption. It uses a small, simple to use, Joulo logger which measures the temperature at the thermostat every two minutes for a week. When this data is uploaded to the MyJoulo website, smart AI programs are used to build a mathematical model of how the home responds to heat and how the home's occupants are using the heating system. Using temperature data from the internet, we can then calculate the energy savings that will be achieved by turning down the thermostat or changing timer settings, and can spot homes which leak heat most rapidly. By creating a representative map of building stock, the MyJoulo project will ultimately be able to identify particularly leaky homes, and prioritise interventions such as the installation of better insulation. Such smart technologies applied within the home are likely to be essential in reducing carbon emissions by 80% by 2050. MyJoulo represents a first step along this path, potentially reducing the millions of Kilowatt hours of energy wasted per year, and saving households money at the same time.

Such smart technologies applied within the home are likely to be an essential step in creating a greener future.

Document 2: adapted from *Why Can't My Computer Understand Me?* by Gary Marcus. The author is a Professor of Psychology and a specialist in child linguistics. This article was written for the *New Yorker Magazine* in 2013.

The voice searches of search engines like Siri and Google may be able to understand sentences like "What movies are showing near me at seven o'clock?"; but what about questions – "Can an alligator run the hundred-metre hurdles?" – that nobody has heard before? Any ordinary adult can figure that one out. (No. Alligators can't hurdle.) But if you type the question into Google, you get information about Florida Gators athletics team. 'Watson', the computer system that won 'Jeopardy!' likely wouldn't do much better. Hector Levesque of the University of Toronto argues that too much research has forgotten about the "intelligence" part of Artificial Intelligence (AI). Levesque and his colleagues have developed a set of problems, designed to be easy for an intelligent person but hard for a machine merely running Google searches.

For example:

'Joan made sure that she thanked Susan for all the help she had given.'

Question: Who had given the help?

   a) *Joan*

   or

   b) *Susan*

The computer can't work out who the 'she' refers to. It can simply count the number of Web pages in which people named Joan or Susan gave other people help. Answering this question demands a fairly deep understanding of the subtleties of human language, sentence construction and the nature of social interaction, which the computer doesn't have the intelligence to work out.

This type of example, which hinges on the linguistic phenomenon known as *anaphora**, is hard both because it requires common sense – which machines still don't have – and because it gets at things people don't bother to mention on Web pages.

Most AI programs are in trouble if what they're looking for is not spelled out explicitly on a Web page. The same problem comes up in image search. Take the phrase "right-handed man". The Web is filled with pictures of right-handed men engaged in unmistakably right-handed actions (like throwing a baseball), which any human working in a photo archive could rapidly sort out. But very few of those pictures are labelled as such. A search for "right-handed-man" instead returns a mixture of sports stars, guitars, golf clubs, key chains, and coffee mugs. Some are relevant, but most are not.

It's not just that contemporary AI hasn't solved these kinds of problems yet; it's that contemporary AI has not understood them, and therefore its application and development will be limited. It has never closely analysed all of the subtle and deep knowledge and language that ordinary human beings have and use.

Trying to rival human intelligence by programming computers will never work because computers cannot cope with the complexities of the human mind.

*Anaphora, in this sense, means 'referring back', and making reference to a word used earlier to avoid repetition.

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