Lesson 4

Artificial Intelligence Controls Robotic Arm to Pack Boxes and Cut Costs

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Computer scientists in the Department of Computer Science in the School of Arts and Sciences at Rutgers University-New Brunswick used artificial intelligence (AI) to control a robotic arm that provides a more efficient way to pack boxes, saving businesses time and money. "We can achieve low-cost, automated solutions that are easily deployable. The key is to make minimal but effective hardware choices and focus on robust algorithms and software," said the study's senior author Kostas Bekris. Bekris, Abdeslam Boularias and Jingjin Yu, who are professors in the Department of Computer Science, formed a team to deal with multiple aspects of the robot packing problem in an integrated way through hardware, 3D perception and robust motion.

Tightly packing products picked from an unorganized pile remains largely a manual task, even though it is critical to warehouse efficiency. Automating such tasks is important for companies' competitiveness and allows people to focus on less menial and physically taxing work, according to the Rutgers scientific team. The Rutgers study focused on placing objects from a bin into a small shipping box and tightly arranging them. This is a more difficult task for a robot compared with just picking up an object and dropping it into a box. Since the study focused on packing cube-shaped objects, a next step would be to explore packing objects of different shapes and sizes. Another step would be to explore automatic learning by the robotic system after it is given a specific task.

The researchers developed software and algorithms for their robotic arm. They used visual data and a simple suction cup, which doubles as a finger for pushing objects. The resulting system can topple objects to get a desirable surface for grabbing them. Furthermore, it uses sensor data to pull objects toward a targeted area and push objects together. During these operations, it uses real-time monitoring to detect and avoid potential failures.

The scientists' peer-reviewed study was published recently at the IEEE International Conference on Robotics and Automation, where it was a finalist for the Best Paper Award in Automation. The study coincides with the growing trend of deploying robots to perform logistics, retail and warehouse tasks. Advances in robotics are accelerating at an unprecedented pace due to machine learning algorithms that allow for continuous experiments.

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A-Skimming

Choose from the list A-E the main idea for paragraphs 1-4. There is one extra letter that you do not need to use.

A. The scientists designed specific software and algorithms for their invention. ____

B. Artificial intelligence controls robotic arm to pack boxes and save time and money.____

C. The research explored workers' ability to pack objects of different shapes and sizes. _____

D. Progress in robotics is developing at an extraordinary rate. _____

E. The study consisted in the robotic arm shifting objects from a container into another. _____

B-Vocabulary

Circle the letter corresponding to best answer for each question.

1. The adjective "automated" in line 4 can be explained as:
a. using other people's strength
b. using computers
c. using instructions
d. using imagination

2. The adjective "robust" in line 5 can be understood as:
a. big
b. user-friendly
c. elegant
d. strong

3. The noun "task" in line 9 can be described as:
a. job
b. profession
c. trade
d. hobby

4. The verb "avoid" in line 22 can be understood as:
a. fear
b. expect
c. prevent
d. result in

5. The verb "deploying" in line 25 can be explained as:
a. watching
b. using
c. listening
d. helping

C- Comprehension Questions

1. Why did a group of professors at Rutgers University form a team?
   a. To play rugby in an international competition.
   b. To deal with the robot packing problem.
   c. To read poetry of the XXI century.
   d. To collect funds for research.

2. What did the scientists do to control the robotic arm?
   a. They recorded a set of instructions to be followed by the robot.
   b. They asked the robot to pack boxes.
   c. They showed the robot how to pack boxes.
   d. They chose hardware and developed software and algorithms.

3. What does the robotic arm do?
   a. It can grab, push and pull objects.
   b. It can swim, jump and run.
   c. It can read and write.
   d. It can think.

4. Which of the following statements is NOT TRUE?
   a. The robotic arm can grab objects.
   b. The robotic arm can pack cube-shaped objects.
   c. The robotic arm can learn new tasks.
   d. The robotic arm can save businesses time and money.

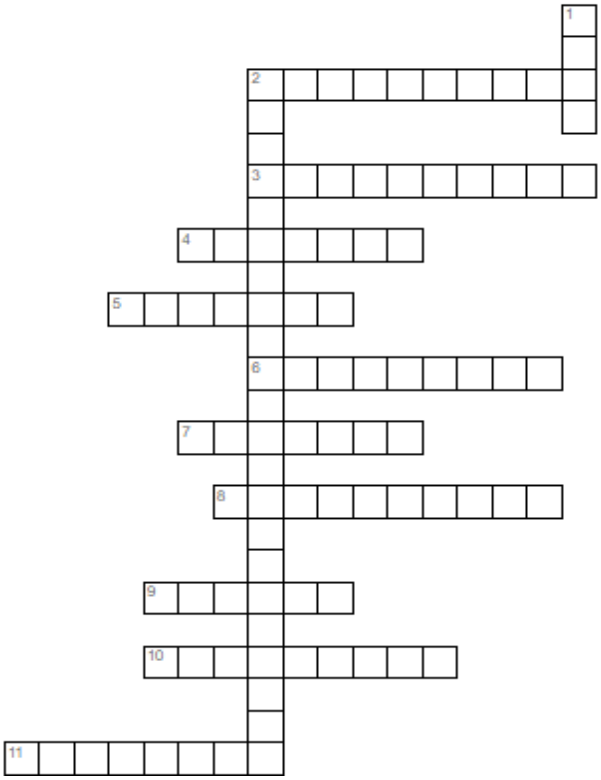
5. One can imagine that robots someday...
   a. will push objects.
   b. will pull objects.
   c. will grab objects.
   d. will learn new tasks.

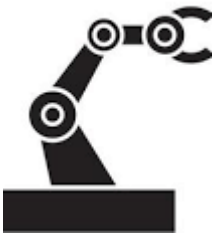
6. The BEST title for this passage would be
   a. The future of artificial intelligence
   b. The development of automation
   c. A robotic arm to pack boxes and cut costs
   d. Research in robotics

D- Reference . Write the referent word(s) at the end of each sentence.

1. What does the relative pronoun “that” in line 3 refer to?
2. What does the subject pronoun “We” in line 3 stand for?
3. What does the object pronoun “them” in line 13 point to?
4. What does the subject pronoun “it” in line 16 denote?
5. What does the noun phrase “the resulting system” in line 19 stand for?
6. What does the subject pronoun “it” in line 24 indicate?

Crossword Puzzle





Across

2 A set of mathematical instructions or rules that, especially if given to a computer, will help to calculate an answer to a problem.
3 That is part of something.
4 A situation in which someone or something does not succeed.
5 The activity of putting things into bags or boxes in order to take them somewhere.
6 The process of planning and organizing to make sure that resources are in the places where they are needed, so that an activity or process happens effectively.
7 To watch something carefullyfor a period of time.
8 A person who does detailed study of a subject in order to discover new information.
9 Boring, and not well paid or respected.
10 A large building for storing things before they are sold, used, or sent out to shops.
11 The physical and electronic parts of a computer, rather than the instructions it follows.

Down

1 To move someone or something by pressing them with your hands or body.
2 The study and development of computer systems that do jobs that previously needed human intelligence.