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**Robots Learning from Demonstration**

On April 6, 2016 Chad Jenkins, Associate Professor at the University of Michigan, gave a presentation called “Perception of People and Scenes for Robot Learning from Demonstration.” In his presentation, he talked about a range of topics which included building a “robot app store” and having robots learn from human demonstration. After attending Jenkins’s lecture, it is easy to see how one day robots could have a huge impact on the world.

Programming a robot to do a set task/tasks in a set environment is something that has been achieved many times before. However, the real challenge comes in while trying to program any robot to do a task in any type of environment. This is the basis behind the “robot app store” Jenkins talked about. The “robot app store” is very similar to the app stores that are currently on many of today’s smart devices. Some developer somewhere writes a program to do a task or solve a problem, uploads it to the app store, and then a user anywhere in the world can download it and use it. The “robot app store” is similar to this concept except, instead of programs for smart devices, the programs are for robots. The problem with this is that it is not currently possible to write a program that can work on any robot in any type of environment. To try to overcome this, Jenkins presented an alternative way to program a robot without explicatively coding in a programing language, called learning from demonstration (LfD).

LfD will allow robots to be “taught” how to perform a task through human demonstration, usually through a video. LfD is very complex and is parsed as a statistical regression problem using multivalued regression algorithms. A simple explanation of LfD is that it takes input in the form of states and maps them to an output action, which is some type of motor movement. After the robot has learned a specific task, it utilizes a finite state machine to decide which action to perform. Jenkins explained that even though they have been successful in teaching a robot and have made a lot of progress, due to the technology limitations it is not ready to be implemented in the everyday world.

One data structure that I believed was used, was a graph, made up of an array of pairs, to implement the finite state machine stated above. Each one of these pairs has a part that corresponds to an action and another part or parts that represent a transition to another state. The robot would start off in the first state and, depending on the input from the outside environment, would transition to another state and performs that action. This would continue until the task is complete.

When the technology finally becomes available needed to make LfD possible, I see it having both a positive and negative impact on society. For example, if robots are able to learn from humans, we will be able to teach them how to perform dangerous tasks that have a chance to potentially harm or kill a human worker. However, this also means robots will take jobs away from humans which will increase unemployment and hurt the economy.

In conclusion, Chad Jenkins’s lecture was about being able to program robots through demonstration, which will allow them to adapt to any environment and, hopefully, one-day lead to the integration of robots into everyday life. Learning from demonstration, I believe, is implemented using a finite state machine which utilizes a graph made up of action, transition pairs. In the future, if this form of programming becomes practical, I think it will change the world for both better and worse.