Chapter 3: The Frontiers of Artificial Intelligence

Top Ten Salient Sentence Strings

1. The main issue here is adapting to changing or chaotic environments as they continually shift. The signature accomplishment of robotics research in this regard is the autonomous vehicle, which navigates roads and negotiates spaces in concert with human-controlled vehicles, bicycles, and pedestrians, despite all the attendant novelty and unpredictability.

2. MIT professor Sherry Turkle, who studies the social effects of technology, warns that mechanical devices that encourage emotional bonding are inherently deceptive and potentially harmful to human relationships.

3. But there are also significant dangers. The same technology that might cure blood-borne cancers can be used to kill you, or perhaps even to control you.

4. Military robots will not be designed to use weapons, they are the weapons.

5. But the more modern approach is to use machine learning, often specialized types of neural nets (called convolutional neural nets, or CNNs), to build models of objects from large collections of examples. Very loosely speaking, CNNs look for patterns in small, overlapping sections of an image, then can spread what they “learn” rst to neighboring sections and then to progressively larger regions of the image.

6. While our eyes and most cameras sample reflected light, there are all sorts of sensors that collect data about the real world beyond what humans can see. Special devices, for instance, can measure infrared (heat), and reflected signals (e.g., radar and vibrations).

7. In other words, computers can “see” things that we can’t.

8. The problem is that unlike textual data, which we can interpret electronically for purposes of cataloging and retrieval, we have no way to manage pictures and videos unless they come labeled at the source or are categorized by a human. (You might be surprised to learn that when you do a Google search for images, you aren’t actually searching the pictures themselves but rather the accompanying labels and text that suggest what may appear. This is why such searches are much less accurate than web page retrieval.)

9. The problem of recognizing speech differs fundamentally from interpreting a picture in that the former presents a single variable (sound waves) that changes dynamically over time, while the latter is a snapshot (so to speak) of re ected light in two dimensions at a single point in time.

10. By automatically finding correlations between the source and target examples, statistical machine translation programs (as they are called) can learn not only the underlying structure of the input samples but how these correlate with the correct translation in the output samples.