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From digital signal processing to artificial intelligence

Digital Signal Processing (DSP) is a general technical term or function which means the processing of discrete-time signals or data sequence either in real-time or off line to get the desirable result. In this paper, we review the history of the development of DSP and the connection to the applications in Artificial Intelligence (AI), including both hardware and software algorithms. Since World War II, if not earlier, electronic engineers have speculated on the applicability of digital hardware techniques to the many problem areas in which signal processing plays a role. Thus, for example, Laemmel (1948) reports a lunchtime conversation among Shannon, Bode, and several other Bell Laboratory scientists on the possibility of employing digital elements to construct a filter. Needless to say, the conclusion was not favorable. Cost, size, power consumption, and reliability strongly preferred analog filtering and analog spectrum analysis techniques. It was not until the mid-1960 that a more formal theory of DSP began to emerge. By then the potential of integrated circuit technology was appreciated and was reasonable to complete signal processing systems that could best be synthesized with digital components. As of today, there are many embedded hardware platforms build on very large scale integrate circuits (VLSI), such as floating-point digital signal processors as well as field programmable gate array (FPGA). At the same time, DSP techniques have been advanced rapidly in recent years and have found many applications in almost every field of technology. In software algorithm development, it starts from adaptive signal processing (1975), then moves to machine learning, neural network, and finally named as artificial intelligence, which becomes a rapid growing field today.

Biography

Hen-Geul Yeh has completed his PhD from University of California, Irvine. Currently, he is the Chair of Electrical Engineering Department, California State University, Long Beach (CSULB), and has served as the Director of the DSP Laboratory since 1986. He has published more than 100 papers in referred journals and conferences in DSP, communications, power and control systems. He has been serving as an Editorial Board Member of IEEE Trans on circuits and systems II since 2016

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