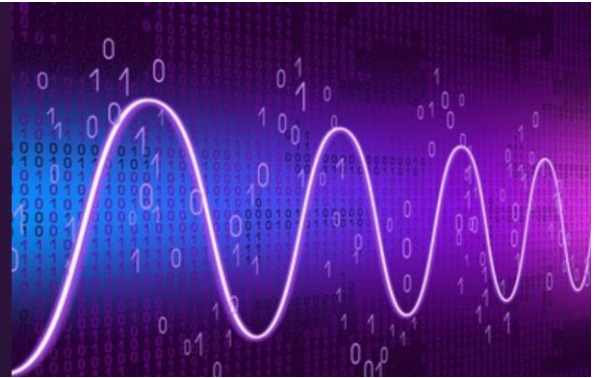


DSP#1

What is Digital Signal Processing ?



Hey folks👋 So, recently I started working as a research intern in an interesting project at my university (I'll let you know more about this project in a separate blog post😊). The project is closely related to the domain of digital signal processing, and I thought of sharing the knowledge on DSP I'm gaining while working, through a series of blog posts. This is the first post in the series, and I'll try my best to make it clear to readers from any field. So here we go...

You're probably aware that the mobile phones, computer equipment, and all the other digital electronics we use in our daily lives transmit digital signals. Thus, Digital Signal Processing is all about these digital signals, which are a special form of data that differentiates it from other fields of computer science. It is the mathematics, the algorithms, and the techniques used to manipulate these signals. It takes real-world signals like voice, audio, video, temperature, pressure, or position that have been digitized and then mathematically process them.

“Digital signal processing (DSP) is the process of analyzing and modifying a signal to optimize or improve its efficiency or performance. It involves applying various mathematical and computational algorithms to analog and digital signals to produce a signal that's of higher quality than the original signal.”

With all of these definitions, you may assume that digital signal processing is heavily reliant on mathematical stuff and is extremely difficult to learn. Yes, it is heavily based on mathematics, but we need this level of detailed mathematics only to grasp the theoretical consequences of the work. The majority of practical DSP techniques can be learned and applied without the usual constraints of extensive mathematics and theory, which will be discussed in the upcoming posts.

Now that we have a fundamental understanding of what digital signal processing is, let's have a look at its evolution. Digital Signal Processing emerged in the 1960s and 1970s, around the era that digital computers were invented. Due to the high cost of computers at the time, DSP was confined to a few important applications in the areas of radar and sonar, oil exploration, space exploration, and medical imaging. With the revolution of personal computers in the 1980s and 1990s, DSP started to be applied in the commercial marketplace including mobile phones, compact disc players etc. However, it is currently being utilized in a wide range of sectors, including space, medical, commercial, telephone, military, scientific, industrial, and so on, sparking a technological breakthrough.



FIGURE 1-3
DSP has revolutionized many areas in science and engineering. A few of these diverse applications are shown here.

The image above depicts some of the uses of DSP in various sectors. If you're a closely related person to an IT or computer science field, you may well aware that DSP is used in image processing, audio processing and telecommunications etc.

Okay, now we got a basic background knowledge of DSP as beginners. Last but not least, there is another important aspect that you should be aware of. DSP

is a highly interdisciplinary field. It is dependent on technical studies in many adjacent fields, and we cannot precisely identify the boundaries between them as sometimes they overlap. Some of those areas you will need to study together include Communication Theory, Numerical Analysis, Probability and Statistics, and Digital Electronics etc.

I hope this post has helped you with some knowledge into Digital Signal Processing. Your feedback is highly appreciated. Let's catch up soon with the upcoming posts in the series. Keep reading