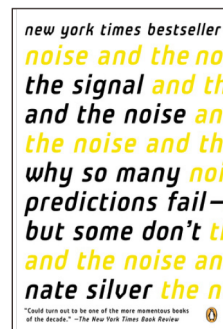


SPACE JAPAN BOOK REVIEW

From a satcom researcher point of view

Reviewer: Takashi Iida, Editorial Advisor



<http://www.penguin.com>

Nate Silver: "The Signal and The Noise —Why So Many Predictions Fail-but Some Don't", Penguin Press, 2012.

"Signal", which is in the title of this book, means truth, and "noise" means those that deflect the eye from the truth. The "signal" and the "noise" are originally terms of electrical engineering, as mentioned in this book. In the case of our handling telecommunications, especially in the radar, the signal processing is combating signal and noise. In order to determine whether the received signal is a significant reflected signal or the noise, Bayes theorem is applied as described in this book [1]. Since such a treatment for even signal in a satellite communication is familiar, this book is thought to be appropriate to this column. This book review is based on Japanese translation version.

Nate Silver, the author of this book, is born in 1978, graduated from University of Chicago, and is a statistical experts and journalists. He is a developer of the predictive model of baseball data analysis, Baseball-Prospectus. He predicted the outcome of 2008 US presidential election and he drew suddenly the limelight by his almost perfect prediction (the 2012 presidential election was predicted perfectly for all the 50 states). He presides over the political prediction blog, FiveThirtyEight.com. He is paid worldwide attention to his unique point of view of statistics about the topic of a wide range of fields such as prediction of various election results, politics, economy, and sports.

Act of prediction is indispensable to our life. Based on the author's experience in this book, the topic of baseball prediction is started, then the election prediction is mentioned in detail. I am remained in particularly impressive with the following two topics after reading this book. The first is a topic of now a day's big data era. Chris Anderson of Wired magazine [2] said that not only theory but also scientific methodology is not necessary, if there is a huge data. The author of this book opposes to this because the number itself does not tell nothing. Speaking it is us. Prediction based on the data sometimes hits, sometimes fails. If our role is denied in the process, the probability of failure increases. The author even said that prediction of big data era does not hit much. I understood the commandments against climate like that big data progress anything get together.

The second is that the Bayes' theorem gives the base of thinking for these prediction. The Bayes' theorem is as follows;

$$p(B|A)=p(A|B)p(B)/p(A)$$

where, $p(A)$: probability of event A, $p(B)$: probability of event B before event A will occur (a priori probability), $p(A|B)$: conditional probability that event A will occur given that event B has occurred (likelihood), $p(B|A)$: conditional probability of event B given that event A has occurred (a posteriori probability). That is, this means that the probability of event B is updated to a posteriori probability from prior probability by multiplication of likelihood $p(A|B)$, reflecting that a certain result on the event A (data) is obtained. Because human thinking is not perfect and we must coexist with the uncertainty, the incremental approach is the most excellent strategy to improve the accuracy of prediction, that we reduce the uncertainty of the information by capturing the future possibility accurately. This book is called this a "Bayes' theorem" thinking.

This book describes about Thomas Bayes, advocate of Bayes' theorem. He was an English Presbyterian minister, and was born in 1701, but his life is known little. The number of his published papers is very little. A famous paper of "An Essay Towards Solving a Problem in the Doctrine of Chances" was published after his death. The content is how we form the probable beliefs to the world, when we confront the unknown data. For example, when a person who appeared in this world sees sunrise for the first time, he/she does not know this is normal or unusual. However, while he/she watches the sun rise every day, he/she becomes to think increasingly that it happens permanently in the nature. By overlapping these statistical inference, the probability of prediction that sun rises also tomorrow approaches 100%. Today, the mathematical expression that is known as "Bayes' theorem" is said to be created by French mathematician Laplace.

Specific interested examples of prediction are described in detail in this book, including weather forecast, earthquake prediction, economic forecasting, influenza epidemic prediction, chess outcome prediction, prediction of hands of poker games, the financial market forecasts, global warming, and terrorism predictions, following baseball prediction and election prediction. Especially, it is said that economic prediction is difficult. Economist could not predict the Lehman shock. It is described in detail that economists could not predict the bankruptcy of Lehman Brothers. The recent forecast of Japan's economic growth rate was proved largely wrong [3]. In the financial market prediction, stock prices have been established because there is a noise. If everyone captures only signal, stock trading is not established. I agree this is a matter of course. However, the Black-Scholes equation [4] is not mentioned on the pricing of derivative financial instruments.

Prediction probability is not necessarily improved even if model becomes detail. The only exception is recent weather forecast that is significantly improved. On the other hand, it is said that earthquake prediction is difficult. Among them, the number of large earthquakes has been mentioned to be a little by the law of Gutenberg Richter. Although this law is announced in 1944, it is regrettable that almost the same "formula of Ishimoto-Iida" [5] that was published from Japan in 1939 is not mentioned. Tendency that only research results of foreign is noted might be the same as that the name of Kitazato disappeared, despite the first discoverer of the plague bacillus is Shibasaburo Kitazato [6].

It is interesting that there is description to verify whether the global warming prediction is correct or not. For prediction of terrorism, first, Pearl Harbor attack of the Pacific War is discussed and was not able to predict it due to much noise. This has been described that the same applies to the study of RAND [7]. Then, difficulty for prediction of 9.11 terrorism is discussed. As far as terrorism and the number of victims are concerned, probability of occurrence for terrorism with large number of victims is small as same as case of earthquake. However, the occurrence of earthquake can not be prevented, while terrorism is different to be able to be prevented. Since the attack on Pearl Harbor is a war, I feel the discomfort to deal with this in the item of terrorism. I feel in the unfortunate that it may be the same thing for the Americans. The damage became larger in the case of the attack on Pearl Harbor, because the naval vessels and aircraft were collected in one place due to fear of rebellion of Japanese-Hawaiian people. Incidentally, a place called Kahuku in Turtle Bay, Hawaii, is where there was a radar that the US military used for the first time in combat. It tracked for more than 30 minutes the planes of the Japanese military attack on Pearl Harbor on December 7, 1941. However, the Lieutenant on duty thought it was a flight of B-17's coming in from California. The U.S. Army did not respond to the warning given by this radar [8].

This book, in addition to the main body of 508 pages, contains a list of vast references over 73 pages. Also, it is interesting that many of the research results have been introduced along with the personality of the researchers. Further, Nikkei Shimbun Book Review [9] would be helpful.

References

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