APPENDIX A

DESCRIPTION OF DATA

A.1 NETWORK TRAFFIC DATA

The traffic data studied in this book include three sources. One is Ethernet traffic. There are four datasets, denoted as pAug.TL, pOct.TL, OctExt.TL, and OctExt4.TL, which can be obtained at ftp.bellcore.com under the directory /pub/world/wel/lan _traffic. Each dataset contains 1 million points representing data of arrival time stamps and packet sizes. The first two datasets were measured on the "purple cable." The last two sets were collected on Bellcore's link to the outside world. Originally all four datasets were simply called LAN traffic. Later, the last two datasets were reclassified as WAN traffic [425]. This classification is more appropriate, since the data were collected on Bellcore's link to the outside world.

Another data source, denoted as MPEG.data, is Bellcore's VBR video traffic data, available at ftp.telcordia.com under the directory /pub/vbr.video.trace. It consists of 174,136 integers representing the number of bits per video frame (at 24 frames/second for approximately 2 hrs).

The third source of data is vBNS (very-high-speed Backbone Network Service) traffic, collected by Dr. Ronn Ritke and his co-workers of the National Laboratory for Applied Network Research (NLANR) measurement and analysis group at the San Diego Supercomputer Center (SDSC) at a number of high-performance-

connection (HPC) sites. The measurement durations of these traffic traces range from 0.5 min to several minutes, with half a million to several million arrivals. They are now available at our dedicated website (see Sec. A.4; for readers' convenience, the aforementioned Ethernet and VBR video traffic traces also appear there).

A.2 SEA CLUTTER DATA

Fourteen sea clutter datasets were obtained from a website maintained by Professor Simon Haykin: http://soma.ece.mcmaster.ca/ipix/dartmouth/datasets.html.

The measurement was made using the McMaster IPIX radar at Dartmouth, Nova Scotia, Canada. The radar was mounted in a fixed position on land 25-30 m above sea level, with an operating (carrier) frequency of 9.39 GHz (and hence a wavelength of about 3 cm). It was operated at low grazing angles, with the antenna dwelling in a fixed direction, illuminating a patch of ocean surface. The measurements were performed with the wave height in the ocean varying from 0.8 to 3.8 m (with peak heights up to 5.5 m) and the wind conditions varying from still to 60 km/hr (with gusts up to 90 km/hr). For each measurement, 14 areas, called antenna footprints or range bins, were scanned. Their centers are depicted as $B_1, B_2, \cdots, B_{14}$ in Fig. A.1. The distance between two adjacent range bins was 15 m. One or a few range bins (say, B_{i-1}, B_i and B_{i+1}) hit a target, which was a spherical block of styrofoam of diameter 1 m wrapped with wire mesh. The locations of the three targets were specified by their azimuthal angle and distance to the radar. They were $(128^0, 2660 \text{ m})$, $(130^0, 5525 \text{ m})$, and $(170^0, 2655 \text{ m})$, respectively. The range bin where the target is strongest is labeled as the primary target bin. Due to drift of the target, bins adjacent to the primary target bin may also have hit the target. They are called secondary target bins. For each range bin, there were 2^{17} complex numbers, sampled with a frequency of 1000 Hz.
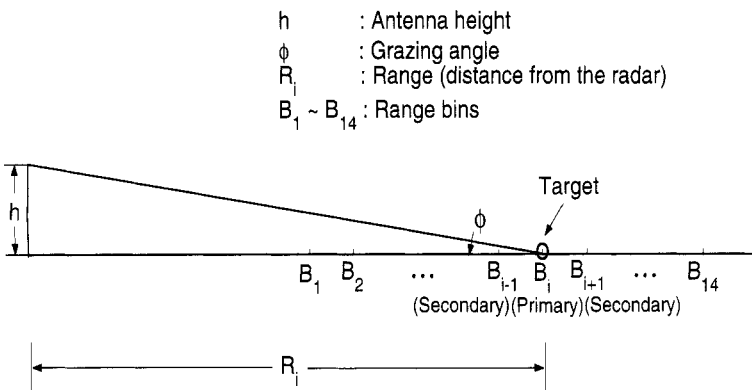

Figure A.1. A schematic showing how the sea clutter data were collected.

A.3   NEURONAL FIRING DATA

Two sources of neuronal firing data were analyzed in this book. One source consists of firings of 104 cells, collected synchronously at Duke University when an owl monkey performed a three-dimensional reaching task involving a right-handed reach to food and subsequent placing of the food in the mouth [471]. The total observation time was about 36 min. While the details of the behavioral paradigm and the surgical procedure for chronic microwire recordings can be found in the literature [471], it is important to mention the components of the paradigm that are important for the discussions presented in Sec. 8.9.2. Microwire electrodes were implanted in four cortical regions with known motor associations [319]. The monkey's hand position, which was considered the desired signal by adaptive models, was also recorded (with a time-shared clock) and digitized with a 200 Hz sampling rate. On average, the time interval between two successive reaching tasks is about 8 s. From the neuronal firing data, spike detection was performed. In our analysis, both interspike interval data and spike-counting data (equivalent to firing rate) have been analyzed. Note that some neurons fired more than 10^4 times during about 36 min, while a few neurons only fired a few tens of times during this entire time period. This indicates the tremendous differences among the neurons.

The second source of data was three patients with Parkinson's disease. The data were collected in two areas, the globus pallidus externa (GPe) and the globus pallidus interna (GPi) of the brain. The sampling time is 20 kHz. These data are analyzed in Sec. 9.5.2.

A.4   OTHER DATA AND PROGRAM LISTINGS

The book has discussed many other types of data, some of which are also used in the exercises. A dedicated book website has been created, which contains two subdirectories, one for data, another for programs. For more details, please see the readme files at http://www.gao.ece.ufl.edu/GCTH_Wileybook.