CS439 – Wireless Networks and Mobile Computing Spring 2015 Project on Fitting Data into Probability Distributions Professor: Maria Papadopouli

Part A

Consider the trace "cell0_2.txt" which contains signal strengths measurements from 2 Access points (APs).

The fields in this trace are of the form:

<timestamp> <AP mac address> <signal strength in dBm>

Plot the CDF of the signal strength of each AP in the same figure. Produce histograms of the signal strength measurements for each AP.

Try to fit the signal strength measurements of each AP into a normal distribution. You will need to extend the provided MATLAB function "envelop_qqplot" for the case of normal distribution.

Part B

Consider the trace "Syslog_data.txt" which contains client association events to APS in a wireless network. Investigate whether the user arrival in AP 410 follows a Poisson process.

Useful tips:

1. To import the file "Syslog_data.txt" into matlab, use the commands:

   fid=fopen('Syslog_data.txt');
   C = textscan(fid, ' %d %d %d %s %s %*[^\n]');
   fclose(fid);

2. Separate the timestamps that correspond to Association events (column 5 in "Syslog_data.txt") of the AP 410. Read "logical indexing" and "cell arrays" from the matlab tutorial (http://www.csd.uoc.gr/~hy439/labs/Tutorial.m). It may be helpful.
3. Calculate the interarrival times for AP 410. Remember that for your data to follow a Poisson process, the inter-arrivals must be independent and exponentially distributed. Check this using "envelop_qqplot".

Consider another distribution called "Pareto". How well are the inter-arrival times of AP 410 described by a Pareto distribution?

General instructions

Keep in mind that you must always try to interpret and provide comments on any plot or value that you calculate.

For every distribution you fit into a specified dataset, you must always provide the numeric values of the distribution's parameters, as well as qqplots and simulation envelopes for the fitting.

You must also submit all the MATLAB code you wrote.

<u>Appendix</u>

Each line in the syslog trace corresponds to an 802.11 client event, i.e. a MAC-level event, related to association and access/confidentiality control services in IEEE 802.11 terminology and has the following columns:

1. Timestamp of the event (in milliseconds from 1970).
2. ID of the AP at which the event takes place (each AP has been mapped to a unique ID).
3. ID of the customer that initiated the event (each MAC address has been mapped to a unique ID).
4. Type of syslog message (it can take the values VxW and IOS).
5. Event type (it can take the values Authenticated, Associated, Reassociated, Roamed, Deauthenticated, Disassociated, Rebooted).
6. Reason for which the event occurs.