**ECE 361 Project Part 2**

**Group 7**

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**Summary:**

The first part of this report is to show the chi square testing of the target present and absent data with respect to Rayleigh distribution, Nakagami distribution, Rician distribution, and Gamma distribution. The chi square testing provides a numerical value to the relationship between a variable and a given distribution. Chi squared value yields a corresponding statistic and degree of freedom, which a lower corresponding statistic and degree of freedom generally means a better fitting distribution to the given data set. Using this test, the best found fit distributions for target absent and present can be used to model the PDF of the data and re-create the ROC curve used to find the optimal threshold initially.

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| --- | --- | --- | --- | --- | --- |
| **Target Present** | | | | | |
|  | **h (0=accept&1=reject)** | **χ2 Statistics** | **Deg. of Freedom** | **Parameter 1** | **Parameter 2** |
| **Rayleigh** | 0 | 3.3792 | 2 | B=2.74442 | N/A |
| **Gamma** | 0 | 5.7266 | 4 | A=7.29062 | B=0.498906 |
| **Nakagami** | 0 | 1.9679 | 2 | mu=2.00199 | omega=15.0637 |
| **Rician** | 0 | 5.072 | 4 | s=3.29599 | sigma=1.44916 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Target Absent** | | | | | |
|  | **h (0=accept&1=reject)** | **χ2 Statistics** | **Deg. of Freedom** | **Parameter 1** | **Parameter 2** |
| **Rayleigh** | 1 | 12.4065 | 5 | B=1.62516 | N/A |
| **Gamma** | 0 | 7.6334 | 4 | A=5.36663 | B=0.391895 |
| **Nakagami** | 1 | 11.4063 | 4 | mu=1.49771 | omega=5.2823 |
| **Rician** | 1 | 14.0845 | 4 | s=1.70034 | sigma=1.09342 |



