

# Operational Statistics for SAR Imagery Report

Chen Yang

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## 1 sample Image

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```
> imagepath <- "../Data/Images/ESAR/"
> HH_Complex <- myread.ENVI(paste(imagepath,
  "ESAR97HH.DAT", sep = ""),
  paste(imagepath, "ESAR97HH.hdr", sep = ""))
> HH_Intensity <- (Mod(HH_Complex))^2
> example <- HH_Intensity[1500:1599,1500:1599]
> vexample <- data.frame(HH=as.vector(example))
> summary(vexample)
      HH
Min.   :      5
1st Qu.: 49397
Median : 139494
Mean    : 486161
3rd Qu.: 382280
Max.    :34400251
> plot(imagematrix(equalize(example))) (figure.1)
```

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## 2 Histogram

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```
> binwidth_complete <- 2*IQR(vexample$HH)*length(vexample$HH)^(-1/3)
> ggplot(data=vexample, aes(x=HH)) +
+   geom_histogram(aes(y=..density..),
+   binwidth = binwidth_complete) +
+   xlab(" Intensities") +
+   ylab(" Proportions") +
+   ggtitle(" Complete Histogram") +
+   theme_few()
```

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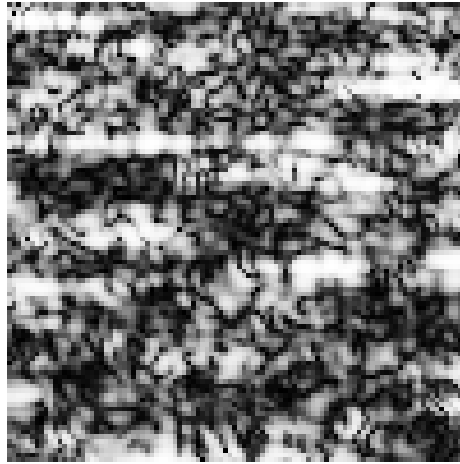


Figure 1:

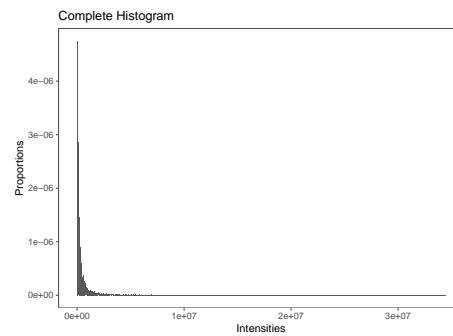


Figure 2:

### 3 LogLikelihood

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```

> LogLikelihoodKnown <- function(params) {
+   p_alpha <- -abs(params[1])
+   p_gamma <- abs(params[2])
+   p_L <- abs(params[3])
+   n <- length(z)
+   return(
+     n*(lgamma(p_L-p_alpha) - p_alpha*log(p_gamma) - lgamma(-p_alpha)) +
+     (p_alpha-p_L)*sum(log(p_gamma + z*p_L))
+   )
+ }

```

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## 4 Estimation

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```
> estim.exampleML <- maxNR(LogLikelihoodLknown ,  
+                             start=c(estim.example$alpha , estim.example$gamma,1) ,  
+                             activePar=c(TRUE,TRUE,FALSE)) $estimate [1:2]  
> estim.exampleML  
[1] -3.866783e+00  1.080319e+06
```

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results all above