INSTITUTO FEDERAL
Paraíba
Campus
João Pessoa

EDUCAÇÃO PÚBLICA 100% GRATUITA

Análise de Sinais e Sistemas

Cálculo da Energia de um Sinal

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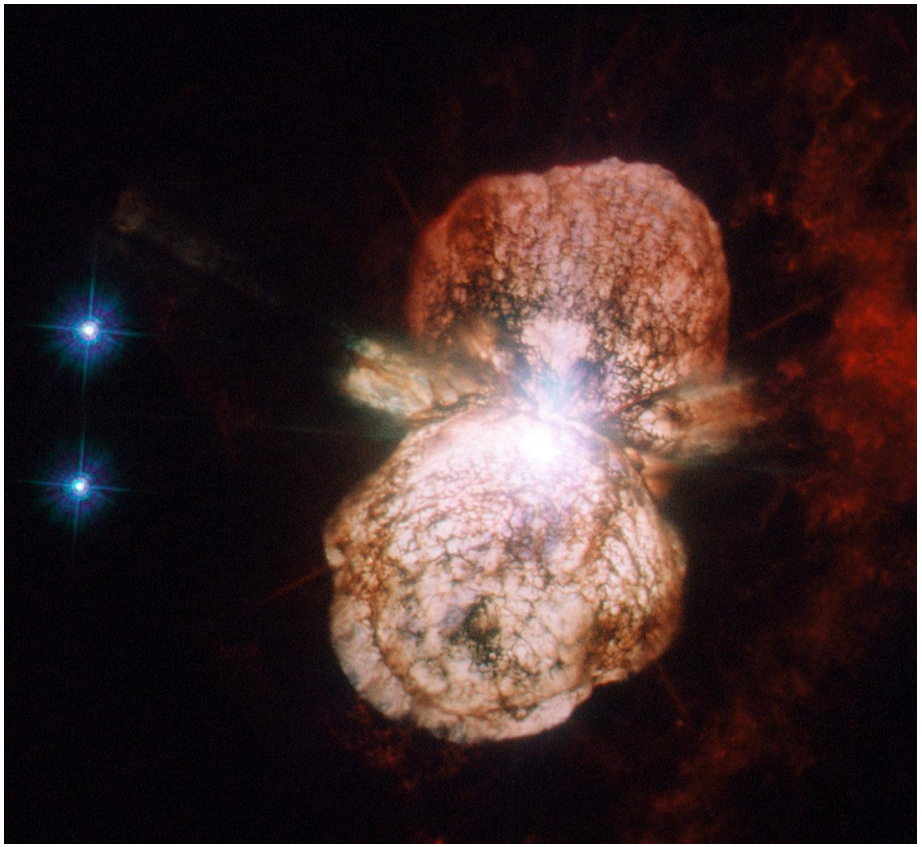
Sinal



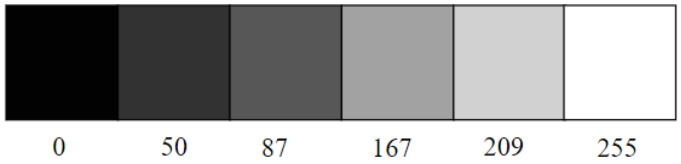
NASA Goddard (2017)

O sinal escolhido é uma imagem obtida no banco de dados da NASA, de autoria do Goddard Space Flight Center, capturada em 2012 e disponibilizada em 2017.

Imagem

y \ x	0	1	2	3	4
0	79	219	136	248	150
1	206	39	108	159	60
2	43	58	101	159	105
3	201	222	233	162	183
4	62	6	213	240	178

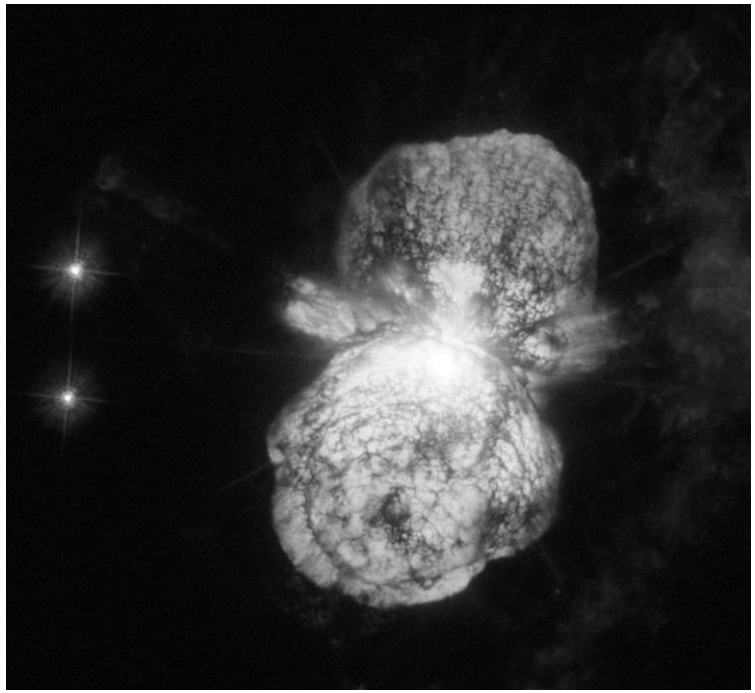
Próprio autor.



Fonte: Shiffman (2008).

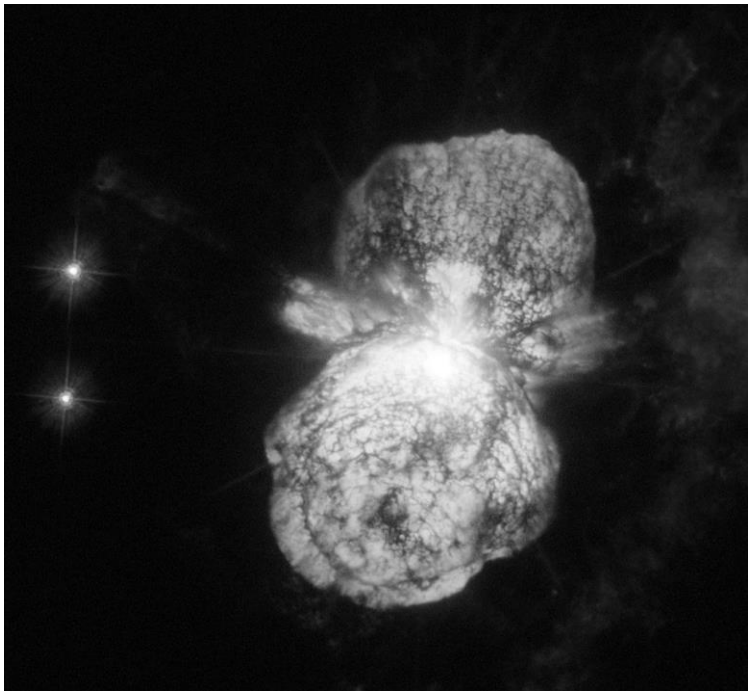
Pré-processamento

- Converter imagem original para escala de cinza

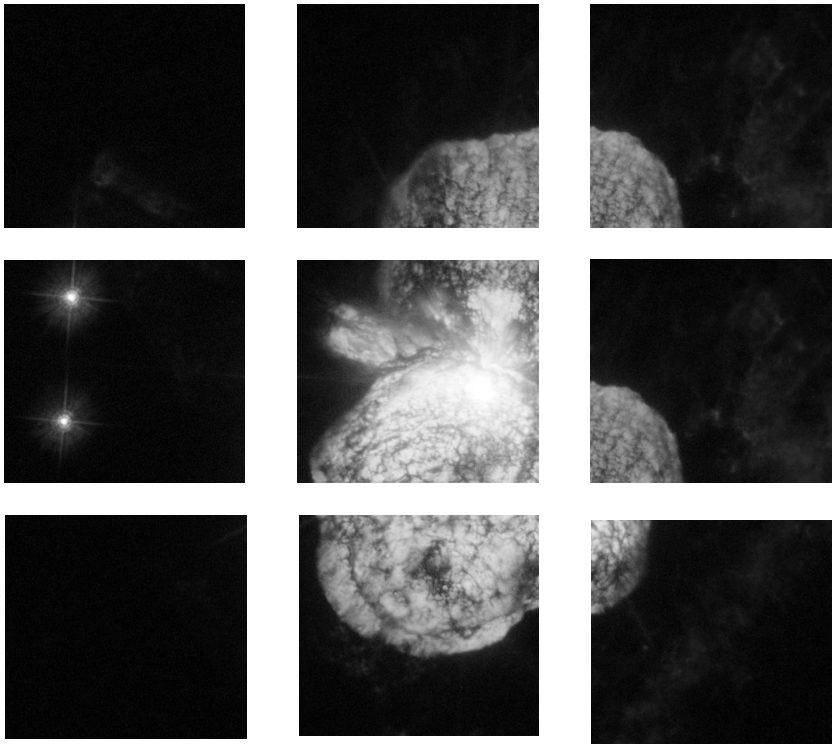


Pré-processamento

- Seccionar a imagem em 9 segmentos



Altura x Largura = 1179 x 1280



Altura x Largura (por segmento) = 393 x 426

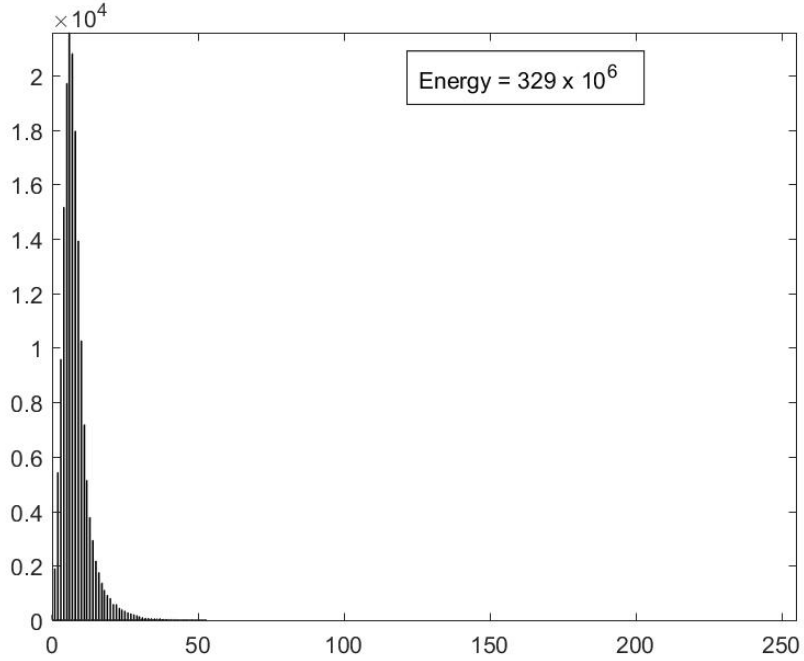
Cálculo da Energia

- A energia de cada segmento de imagem é dada por:

$$Energy = \sum_{x=1}^{426} \sum_{y=1}^{393} p(x,y)^2$$

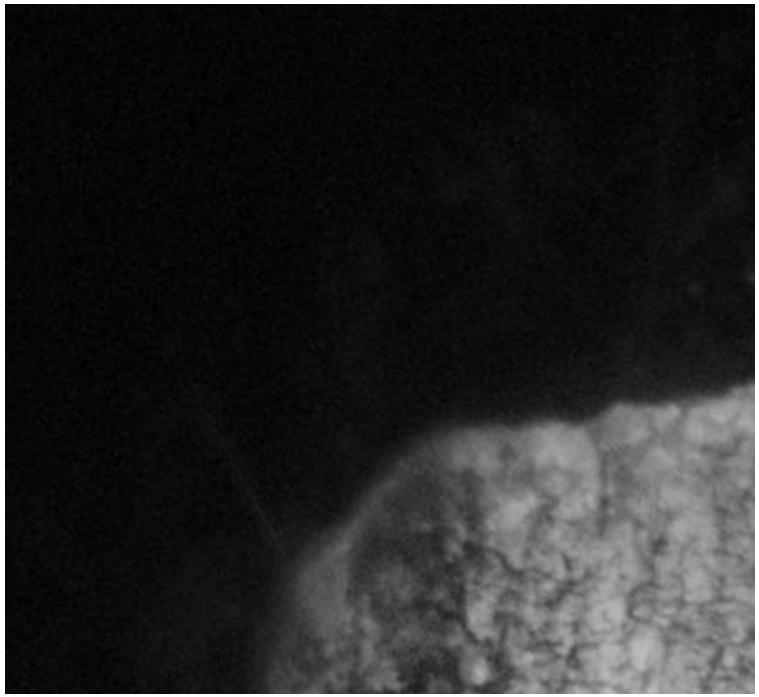
Cálculo da Energia

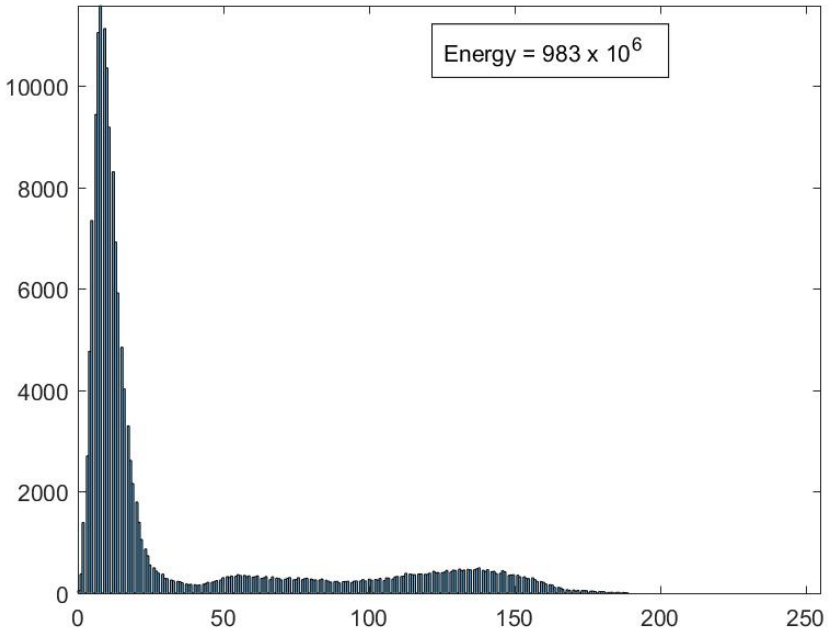
Segmento (1,1)



Cálculo da Energia

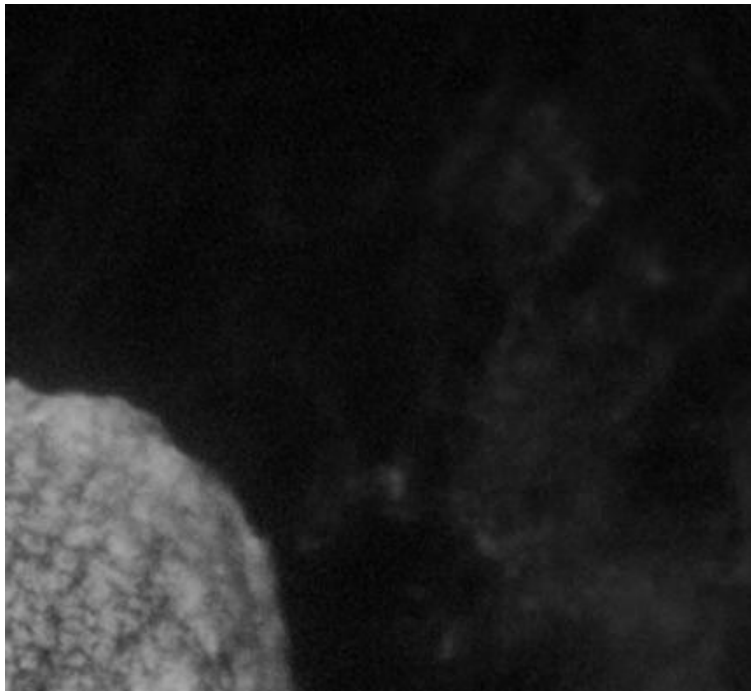
Segmento (1,2)

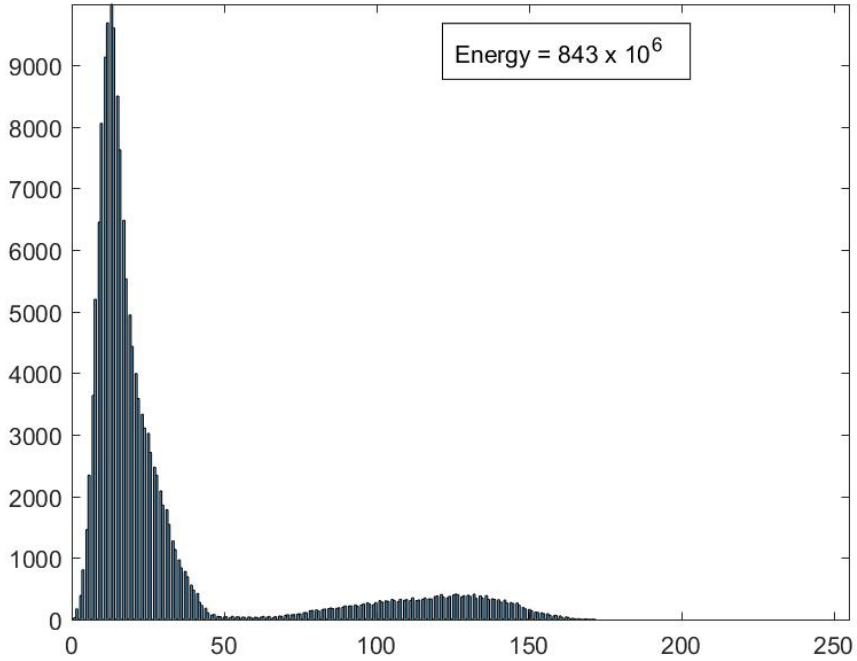




Cálculo da Energia

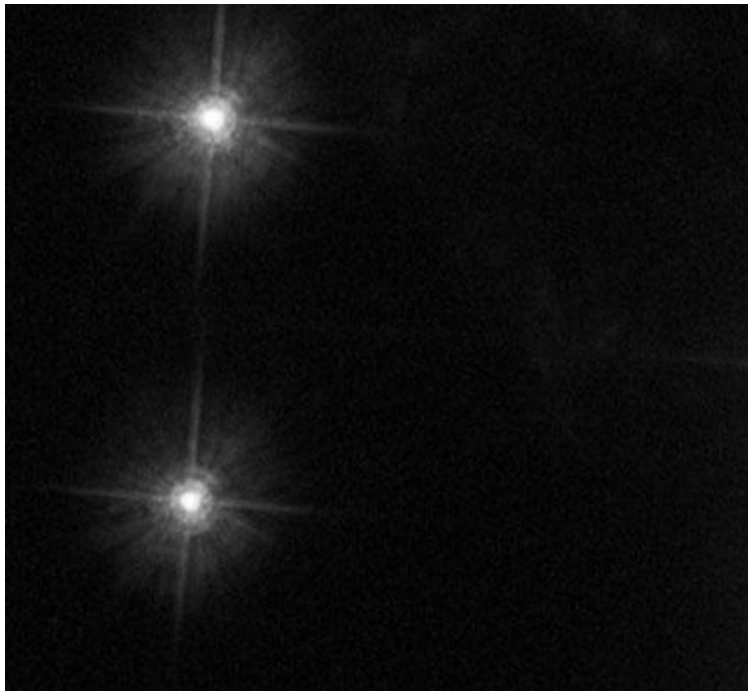
Segmento (1,3)

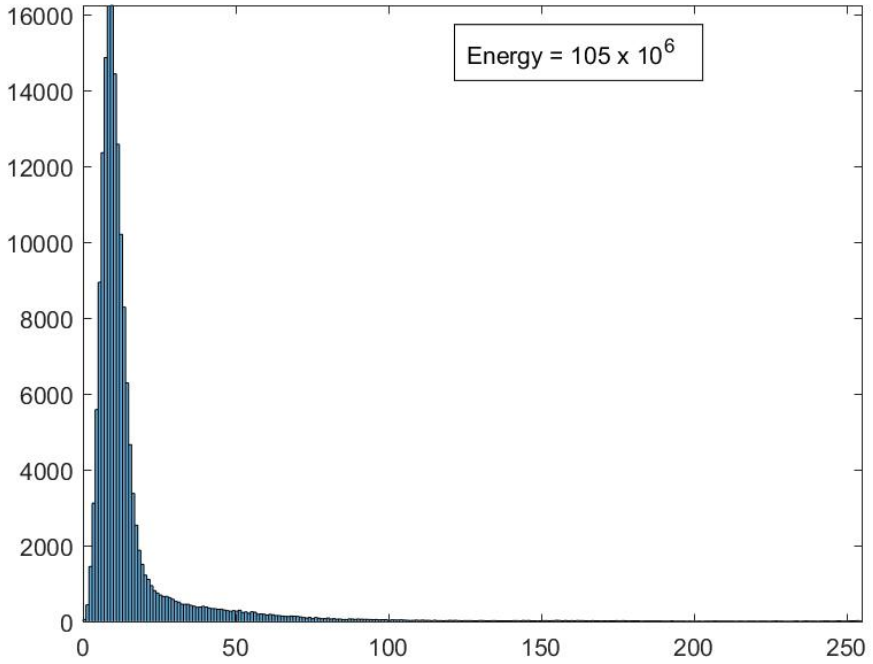




Cálculo da Energia

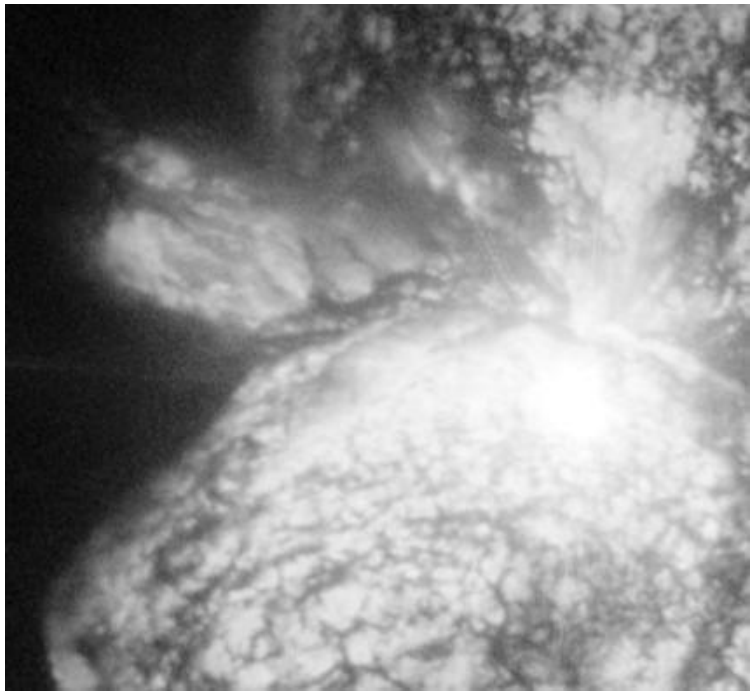
Segmento (2,1)

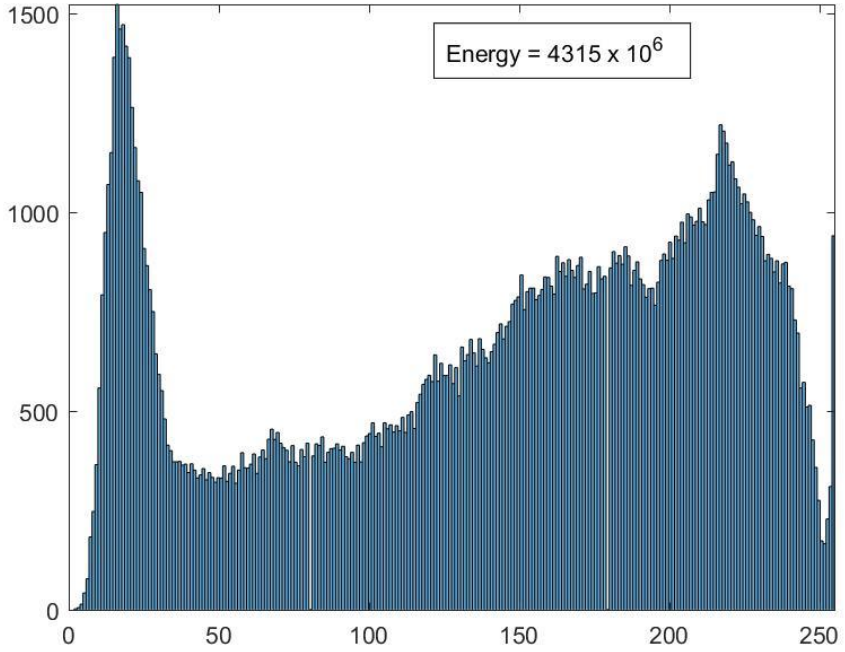




Cálculo da Energia

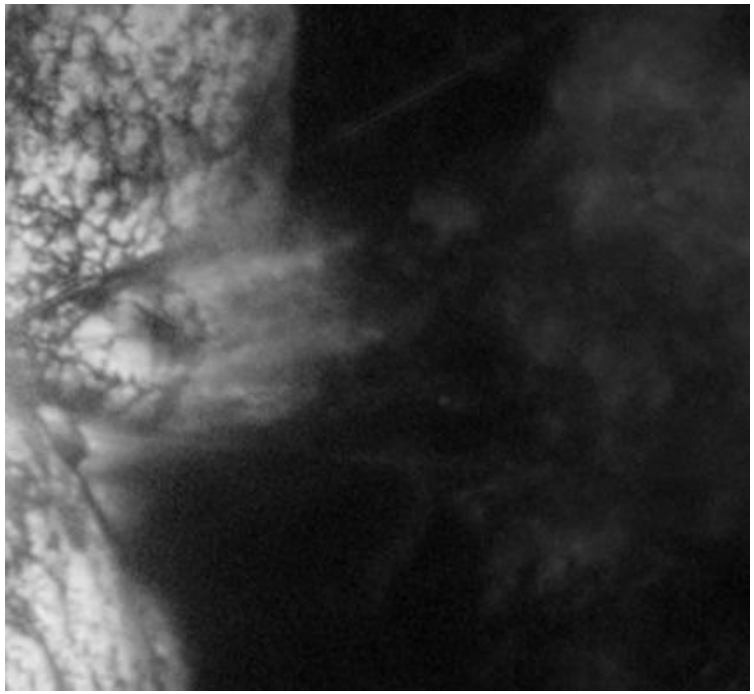
Segmento (2,2)

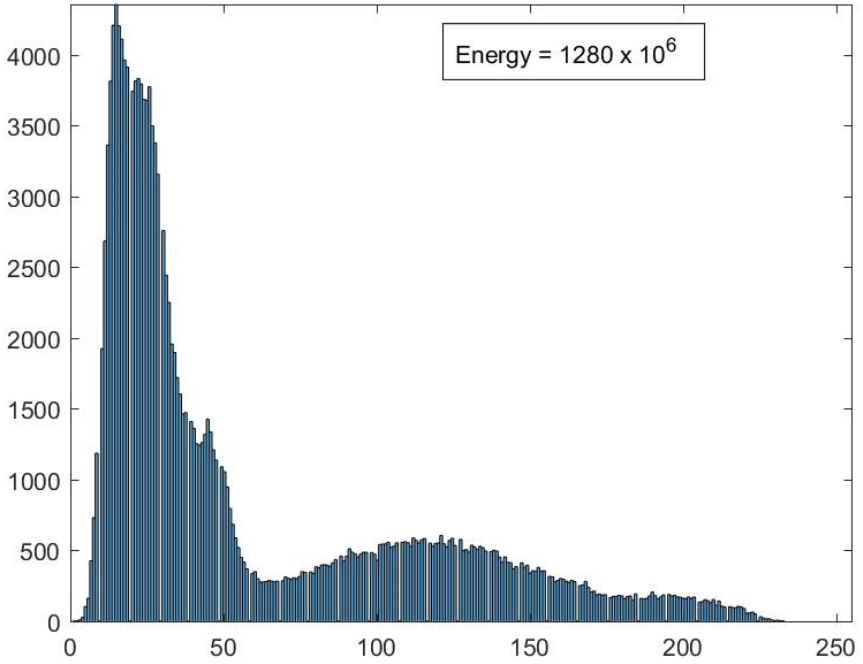




Cálculo da Energia

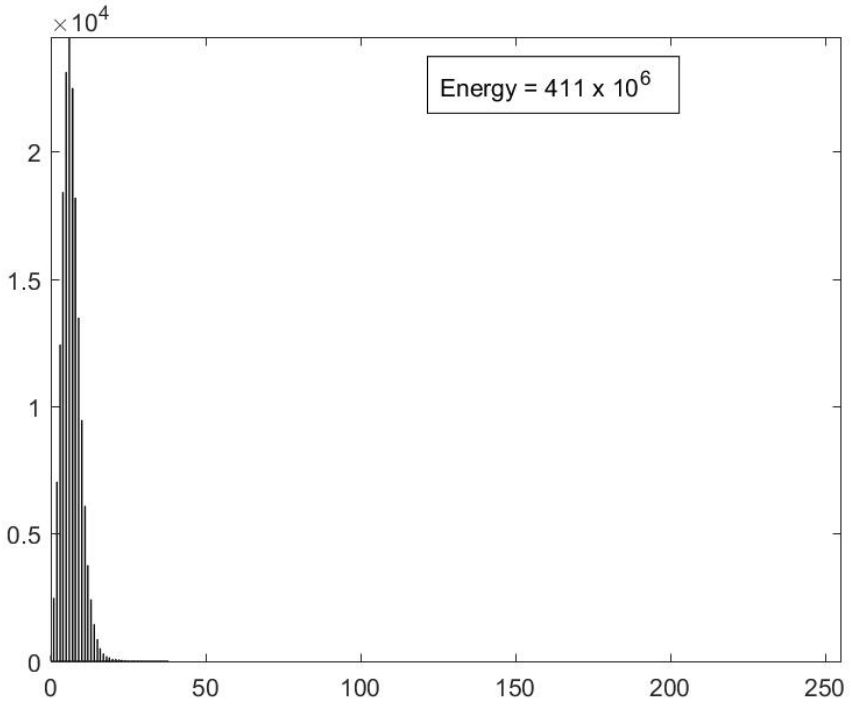
Segmento (2,3)





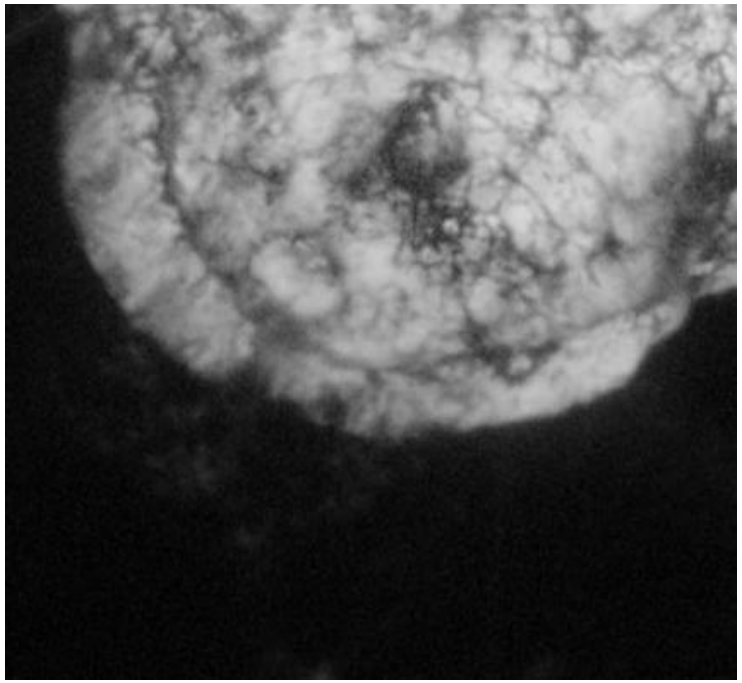
Cálculo da Energia

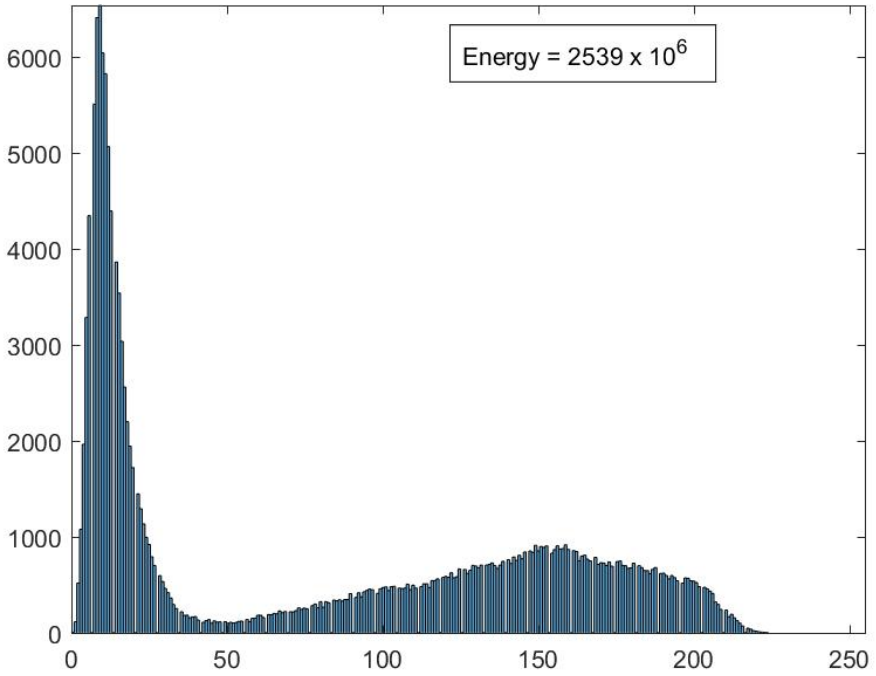
Segmento (3,1)



Cálculo da Energia

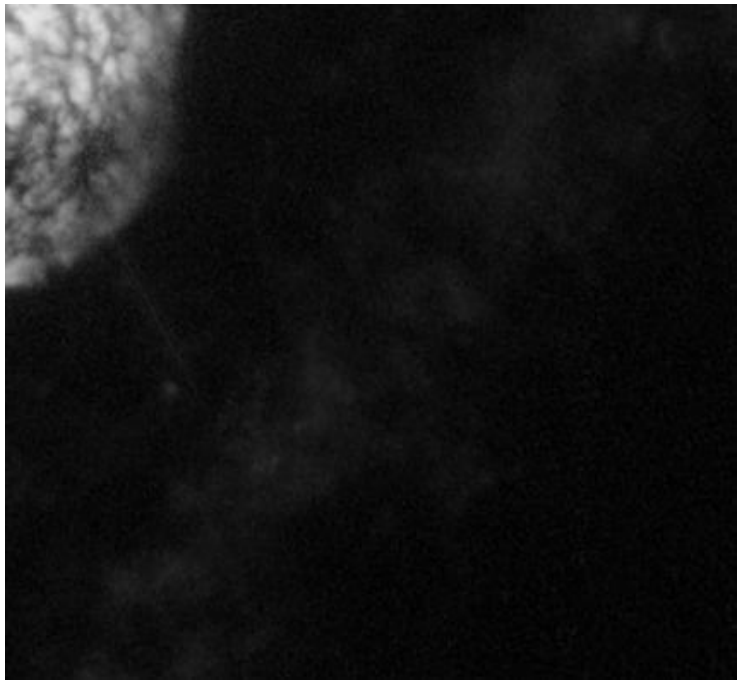
Segmento (3,2)

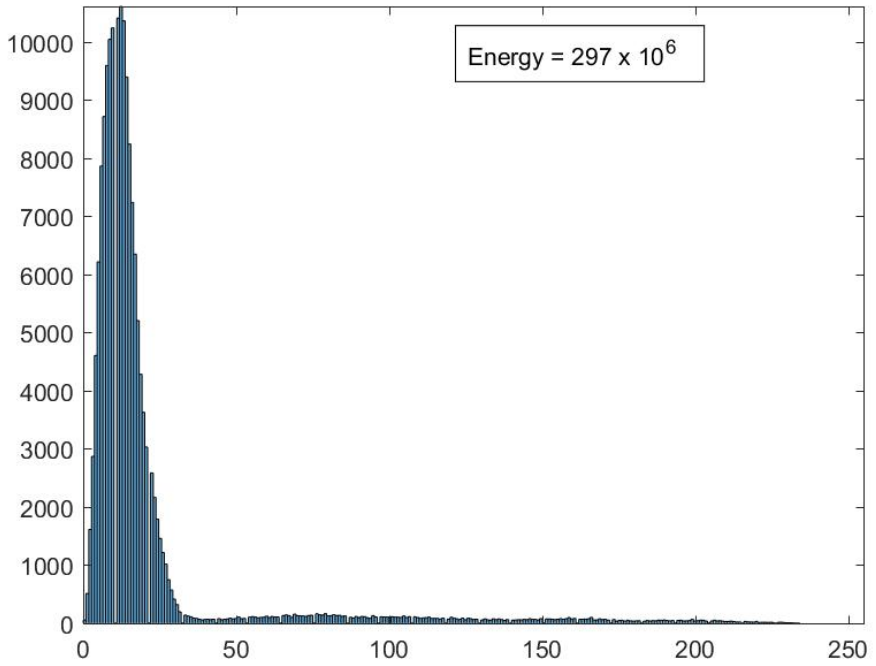




Cálculo da Energia

Segmento (3,3)





Cálculo da Energia

Segmento	Energia ($x10^6$)
(1,1)	329
(1,2)	983
(1,3)	843
(2,1)	105
(2,2)	4315
(2,3)	1280
(3,1)	411
(3,2)	2539
(3,3)	297

Conclusão

- A energia pode ser uma boa métrica de classificação quando utilizada de forma localizada.
- Uma diferença ainda maior entre os segmentos poderia ser encontrada se o tamanho de cada segmento analisado fosse menor.

Referências

- NASA Goddard. GSFC_20171208_Archive_e001783. NASA Image and Video Library, 2017. Disponível em: <https://images.nasa.gov/details-GSFC_20171208_Archive_e001783>. Acesso em: 27 de Maio de 2020.
- SHIFFMAN, Daniel. Color. Processing, 2008. Disponível em: <https://processing.org/tutorials/color/>. Acesso em: 27 de Maio de 2020.

MUITO OBRIGADA

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