Atividade Fundamentos de Data Stream Mining
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1) Implemente o algoritmo a seguir na linguagem de sua preferência.

```
Algoritmo teste(double delta, double stream[])
{
    // W é uma sliding window e deve inicializar com alguns elementos iniciais da stream, pelo menos 2
    inicializar(W)
    cont = 2 // tamanho de W, usado apenas para formatação de saída
    para cada instância xi em stream faça
    {
        coloque xi no inicio de W;
        flag = false
        i = len(W) - 1
        enquanto(nao(flag) e (i >= 0))
        {
            w0 = valores de W de 0 até i - 1
            w1 = valores de W de i e até len(W)
            u0 = media em w0
            u1 = media em w1
            ecut = ecut(w0, w1, delta)
            se (|u0 - u1| > ecut)
                flag = True
                retire o elemento do fim de W
            i = i - 1
        }
        if(flag)
            imprima("Flag: " + cont)
        cont++
    }
    return media em W
}
```

2) A função *ecut* implementa o Hoeffding Bound, usado para calcular o erro em relação à média de uma amostra a partir de um fator de confiança delta. Ela deve implementar a equação a seguir.

$$m := \frac{2}{1/|W_0| + 1/|W_1|}$$

$$\epsilon_{cut} := \sqrt{\frac{1}{2m} \cdot \ln \frac{4|W|}{\delta}} .$$

3) Use as séries fornecidas como exemplo e execute o algoritmo sobre elas e responda:
   a) Para que vc acredita que esse algoritmo é útil?
   b) Analise os pontos indicados na saída do algoritmo. O que eles têm de diferente?
   c) Em quais aplicações você acredita que ele pode ser utilizado? Como e quais resultados ele poderia trazer?

Anexo 1: Exemplos de séries

Série 1:

[0.2,0.3,0.1,0.99,0.99,0.99,0.2,0.1,0.2,0.2,0.2,0.1]

Série 2:

[0.2,0.3,0.1,0.99,0.99,0.99,0.2,0.1,0.2,0.2,0.2,0.1,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.1,0.2,0.3,0.1,0.99,0.99,0.99,0.2,0.1,0.2,0.2,0.2,0.1]

Série 3:

[0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.9,0.9,0.9,0.8,0.8,0.9,0.8,0.9,1.0,0.9,0.9,0.9,0.8,0.8,0.9,0.8,0.9,1.0,0.9,0.9,0.9,0.8,0.8,0.9,0.8,0.9,1.0,0.9,0.9,0.9,0.8,0.8,0.9,0.8,0.9,1.0,0.9,0.9,0.9,0.8,0.8,0.9,0.8,0.9,1.0,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.3,0.1,0.1,0.2,0.2,0.2,0.2,0.2,0.2,0.2]