ALGORITHM-2 PRACTICAL ANALYSIS

i) Algorithm-2 is ready, if t_{ij}s (true) are provided.

ii) We planned to obtain t_{ij}s from Algorithm 1, which takes $y(t)_s$ (mic. recorded signals) & Θ (measurement matrix) as inputs.

iii) we have $y(t)_s$, but not Θ.

⇓

How do we get it?

iv) This makes it unclear, so other option is echo-sorting:

v) Echo sorting takes $h(t)_s$ (RIRs) & Microphone EDM as i/p & gives t_{ij} as output.

vi) we have $h(t)_s$ & doesn't have Microphone EDM(D).

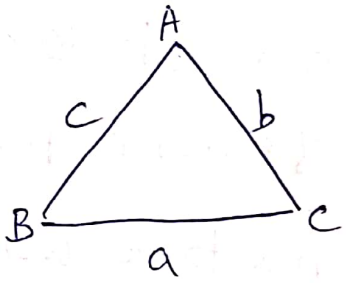
vii) Though, we can find D by using Ogle Inequalities approximately (multiply speed of sound to time stamps). Take direct peaks (1st peaks) in every $y(t)$ &

· Compute the microphone EDM (D), by using ogular Inequalities.

viii) previously, I remember we have gone through this by using under estimates part (though it is not that good to consider as an input to any EDM approximation method like alternating descent, SDR etc, to get true EDM as output)

ix) But If we continue to move in this direction, consider the following analysis.

→ Consider a triangle.



Δgle Inequalities:-

$a-b < c$ etc.

$a+b > c$ etc.

i) **original EDM:-**

$$\begin{bmatrix} 0 & c^2 & b^2 \\ c^2 & 0 & a^2 \\ b^2 & a^2 & 0 \end{bmatrix}$$

ii) **Under EDM (underestimates)**

$$\begin{bmatrix} 0 & (a-b)^2 & (a-c)^2 \\ (a-b)^2 & 0 & (b-c)^2 \\ (a-c)^2 & (b-c)^2 & 0 \end{bmatrix}$$

iii) **over EDM (over estimates):-**

$$\begin{bmatrix} 0 & (a+b)^2 & (a+c)^2 \\ (a+b)^2 & 0 & (b+c)^2 \\ (a+c)^2 & (b+c)^2 & 0 \end{bmatrix}$$

iv) **GP EDM:-**

$$\begin{bmatrix} 0 & |(a+b)(a-b)| & |(a+c)(a-c)| \\ |(a+b)(a-b)| & 0 & |(b+c)(b-c)| \\ |(a+c)(a-c)| & |(b+c)(b-c)| & 0 \end{bmatrix}$$

Note:- GP_EDM is the matrix formed by Geometric progression b/w corresponding elements of Under EDM & over EDM.

Examples (a,b,c)	Rel_err_under	Rel_err_over	Rel_err_GP
(3,4,5)	0.9028	2.8953	0.5803
(6,10,11)	0.8302	2.8989	0.3776
(3,7,9)	0.6990	2.7901	0.5504

Apart from the examples in table, any example is following the same trend, i.e,

$$rel\_err\_gp < rel\_err\_under < rel\_err\_over$$

Thus, it is good to go with GP EDM matrix rather than under EDM & over EDM.