

Input :

$$\{(z_k, G(z_k))\}, k = 1, \dots, n$$

Step1 :

chosen points set A

wating points set B

Put all z_k into B

best_err= ∞

best_A= \emptyset

best_weight= \emptyset

$$R(z) = |G(z) - \bar{G}|, z \in B$$

$$L = \left(\frac{G(z_j) - G(z_k)}{z_j - z_k} \right)_{jk}$$

L is called Lowner matrix.

Setp2 :

choose

$$z' = \operatorname{argmax}_{z \in B} R$$

add z' into A and delete z' from B

Denote L_{AB} as the submatrix of L that the rows of L_{AB} correspond to the rows of A where the elements are located, and the columns of L_{AB} correspond to the columns of B where the elements are located.

Select w as the eigenvector corresponding to the smallest singular value of L_{AB}

Step 3.

Construct Barycentric rational approximation with A

$$\frac{N_A}{D_A}$$

$$N_A(z) = \sum_{z_j \in A} \frac{w_j G(z_j)}{z - z_j}, \quad D_A(z) = \sum_{z_j \in A} \frac{w_j}{z - z_j}$$

Step 4.

Renew:

$$R(z) = \left| G(z) - \frac{N_A(z)}{D_A(z)} \right|, \quad z \in B$$

Step 5.

$$err = \max_{z \in B} R(z)$$

if $err < best_err$

Renew:

$best_err = err$

$best_A = A$

$best_weight = w$

Step 5.

If the $best_err$ is sufficiently small, or if many iterations have been performed, or if the residual has not changed significantly over the last few iterations, then terminate the loop.

Otherwise, return to Step 2.

Step 6.

return $best_A, best_weight$