MA 691: Statistical Simulation and Data Analysis
Term Project - 1
Results

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Task: Perform the EM Algo as given in the paper: "Statistical Inference for a New Class of Multivariate Pareto Distributions" by Alexandru et al.

Approach 1

As given in the paper.

Result : The approach was not working because solving the equation for σ using numerical methods was giving negative values most of the time.

Approach 2

Used fixed point iteration for calculating the value of σ, fixed point iteration are performed at each iteration of EM till the value of σ will converge.

Result: The value of σ diverged and it often gave NaN error.

Approach 3

Used fixed point iteration for calculating the value of σ, only one iteration of fixed point iteration is performed with one iteration of EM.

Result:
Number of iteration of EM : 366
MSE of the parameters :

- $\alpha_0 = 0.64673$
- $\alpha_1 = 0.47758$

- $\alpha_2 = 0.57860$
- $\mu_1 = 0.24363$
- $\mu_2 = 0.22996$
- $\sigma_1 = 0.31049$
- $\sigma_2 = 0.35654$

Approach 4

The fixed point iteration step for the value of σ is performed before the E step of the EM algorithm to estimate the value of the parameter.

Result:

Number of iterations of EM : 414 MSE of the parameters :

- $\alpha_0 = 0.64190400$
- $\alpha_1 = 0.64809548$
- $\alpha_2 = 0.76650006$
- $\mu_1 = 0.23400156$
- $\mu_2 = 0.24665287$
- $\sigma_1 = 0.32721098$
- $\sigma_2 = 0.27668767$