

SIMULATION MATLAB CODE

Advanced Codebook Generation Using High-Resolution k-Means Clustering to PMI Data

VERSION 1.1

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Update History

[2024-07-12] Version 1.0

- Initial version code.

[2024-07-15] Version 1.1

- Update the code for plotting figure 6 & 7

Contents

- **Folders/files**
- **Structures Diagram**
- **Code Explanation [Demo.m, Figure_3.m, Figure_6and7.m]**

PMI-based Codebook Enhancement Github Code

generateChannel.m – Generate channels based on Saleh-Valenzuela channel model

enhanceCodebook.m – Generate enhanced codebook using the proposed codebook enhancement method

generateDFT.m – Generate DFT codebooks

generateVQ.m – Generate perfect location information-based codebooks

Sum_rate.m – Evaluate sum-rate performance using codebooks

rank_adaptive_sum_rate.p – Evaluate sum-rate using the rank adaptive scheme

KDE_setup.m – Set up for kernel density estimation (KDE)

Plot1.m
Plot2.m
Plot3.m } Plot the process of proposed codebook enhancement

location_xs.mat – UE locations generated by SUMO

Demo.m – Demo code for explanation this simulator.

Figure3.m – Draw figure 3 in the paper

function

- The files in function folder are used in simulations
- File list

ARV_UPA.p	sph2xyz.p
Codebook_DFT.p	SV_channel.p
Codebook_VQ.	xyz2sph.p
inverse_rotation.p	
kmeans_plus_clustering.p	
laprnd.p	
PMI2sph.p	
rotation.p	

channel

- This folder is generated and populated by generateChannel.m file.

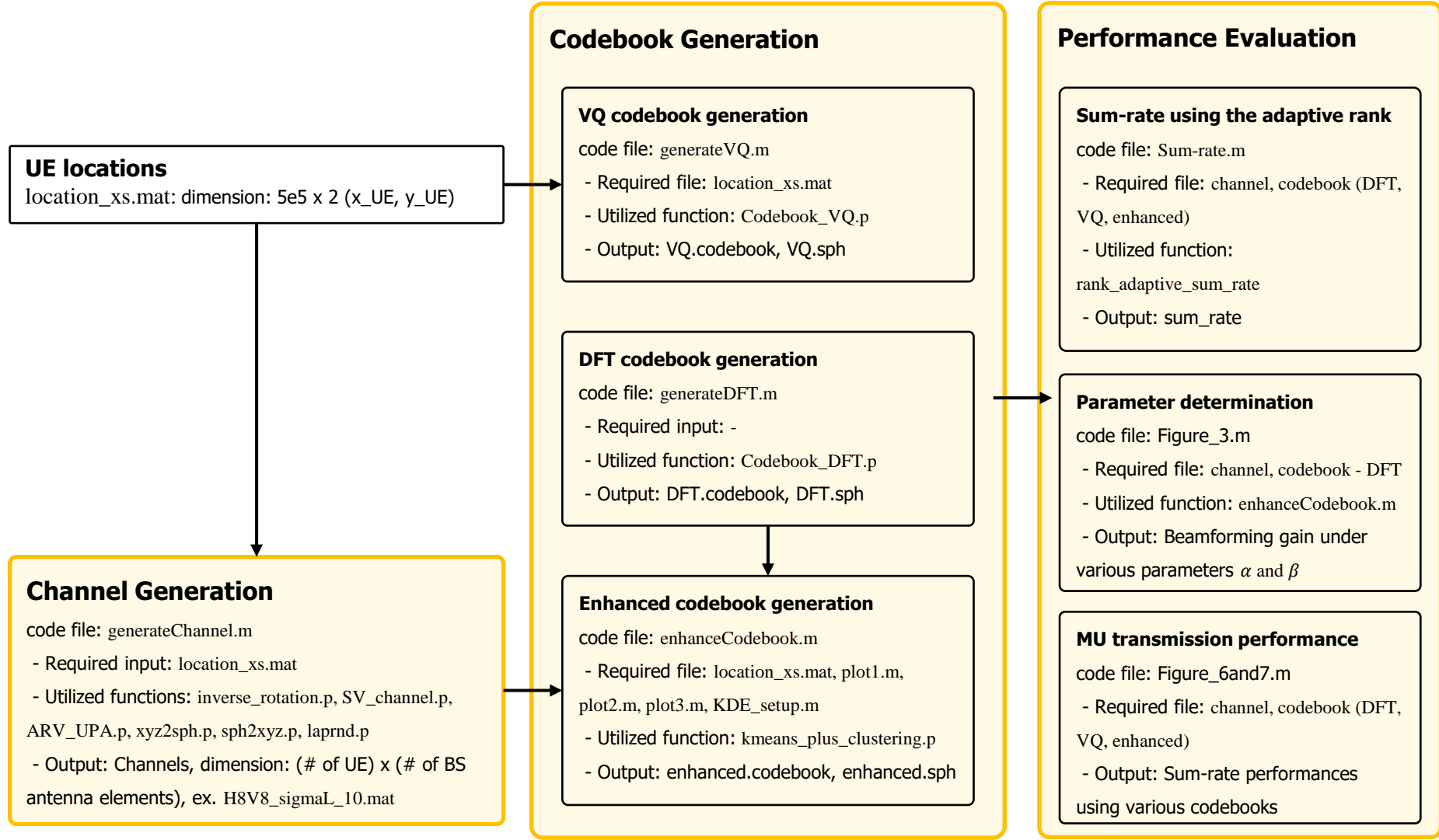
codebook

- This folder is generated and populated by enhanceCodebook.m, generateDFT.m, and generateVQ.m files.

sum_rate

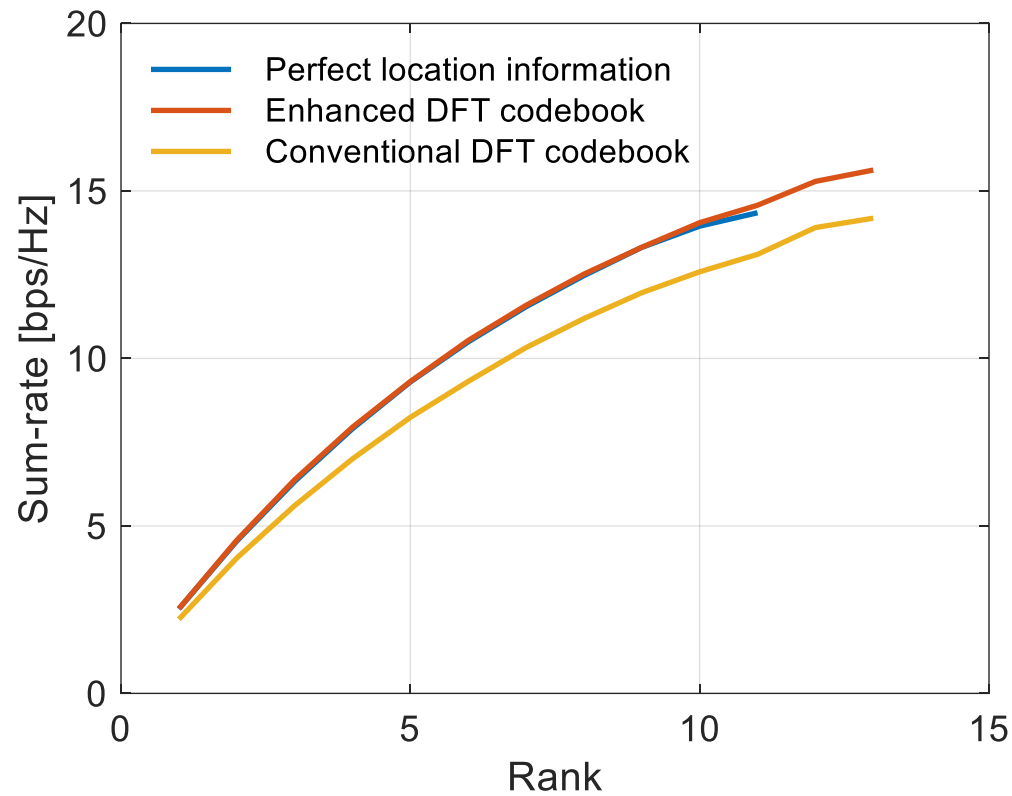
- This folder is generated and populated by Sum_rate.m file.

Structure Diagram



Code Explanation [Demo.m]

- Execute all parts of the structure diagram to plot the sum-rate results.
- Output figure:



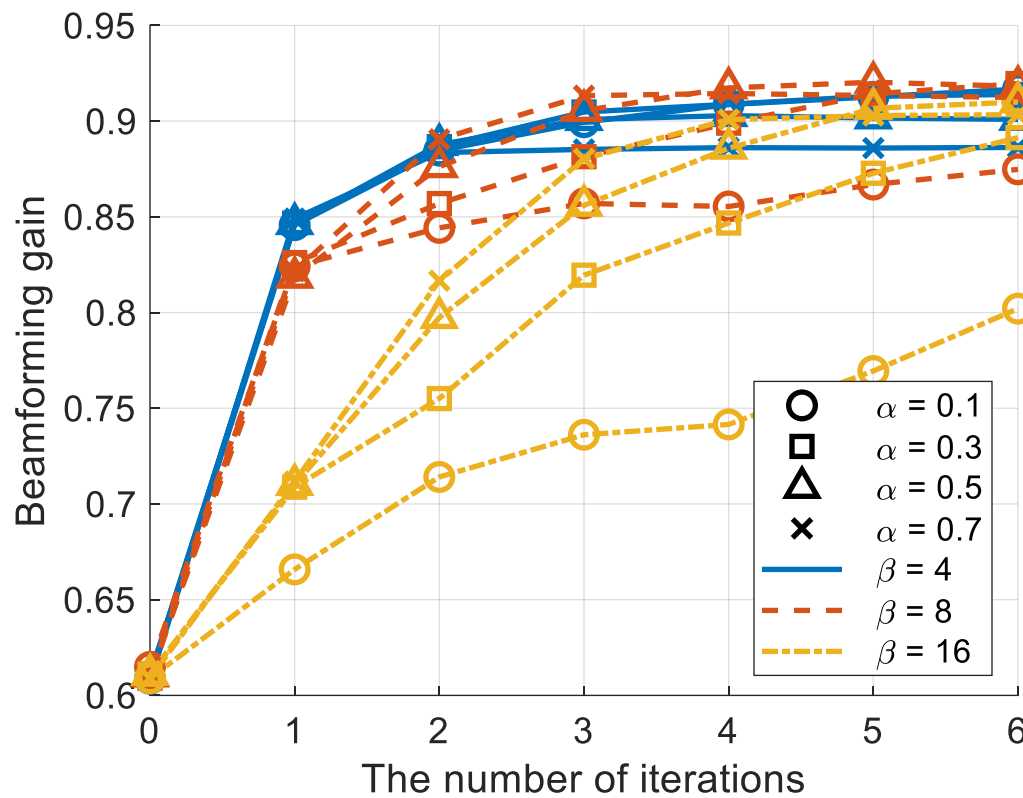
Code Explanation [Figure_3.m]

[CPU: i5-11400F, RAM: 32GB]

Required time: 1870 sec

Required memory: 3 GB

- Plot the figure 3 in the paper
- Output figure:



Code Explanation [Figure_6and7.m]

[CPU: i5-11400F, RAM: 32GB]

Required time: 680 sec

Required memory: 3 GB

- Plot the figure 6 and figure 7 in the paper
- Output figure:

