Annexure C
Non-normalized data for DCR and DCP models

Following is an illustration of 1D ring model with 20 nodes and 4 outgoing synapses for every node ($n = 20$ and $k = 4$) (Figure C.1).

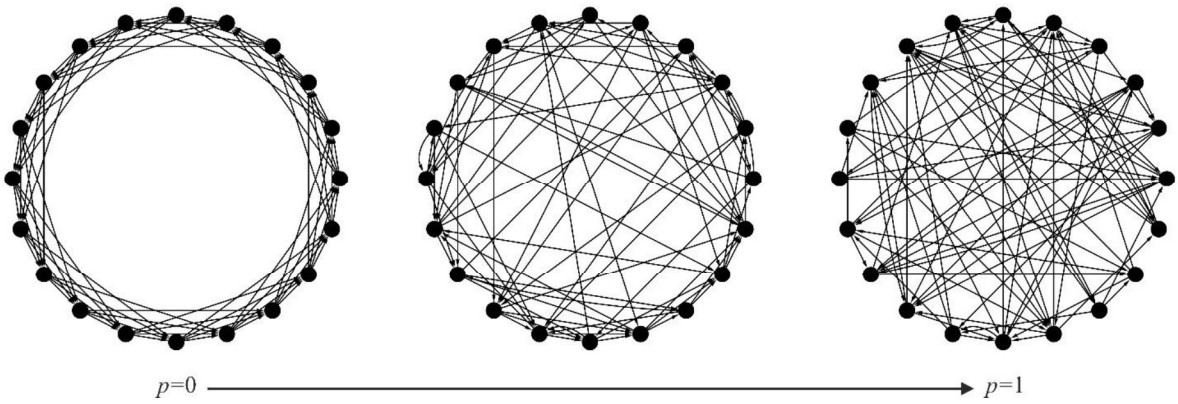

Figure C.1 : Regular graph for maximum number of Feed forward motifs with graph growth. Edges are directed and point from nodes to nearest neighbours along with neighbour of neighbours and so on. This representation is for $\boldsymbol{n = 20}$ and $\boldsymbol{k = 4}$.

Starting from a 1-D regular ring graph maximally saturated with 7756 FFMs, we simulated random synaptic rewiring to observe its effect on topological features. In addition FFMs saturation, the regular graph had very high average clustering coefficient ($\overline{C_{reg}} = 0.35$, Figure C.2) as well as characteristic path-length ($L_{reg} = 17.69$; Figure C.3). Figure C.4 shows with increasing probability of synaptic rewiring the number of FFMs is unaffected up to $p \approx 0.01$ before falling sharply. These figures depict non-normalized data corresponding to Figure 5.4 in Chapter 5 of thesis.

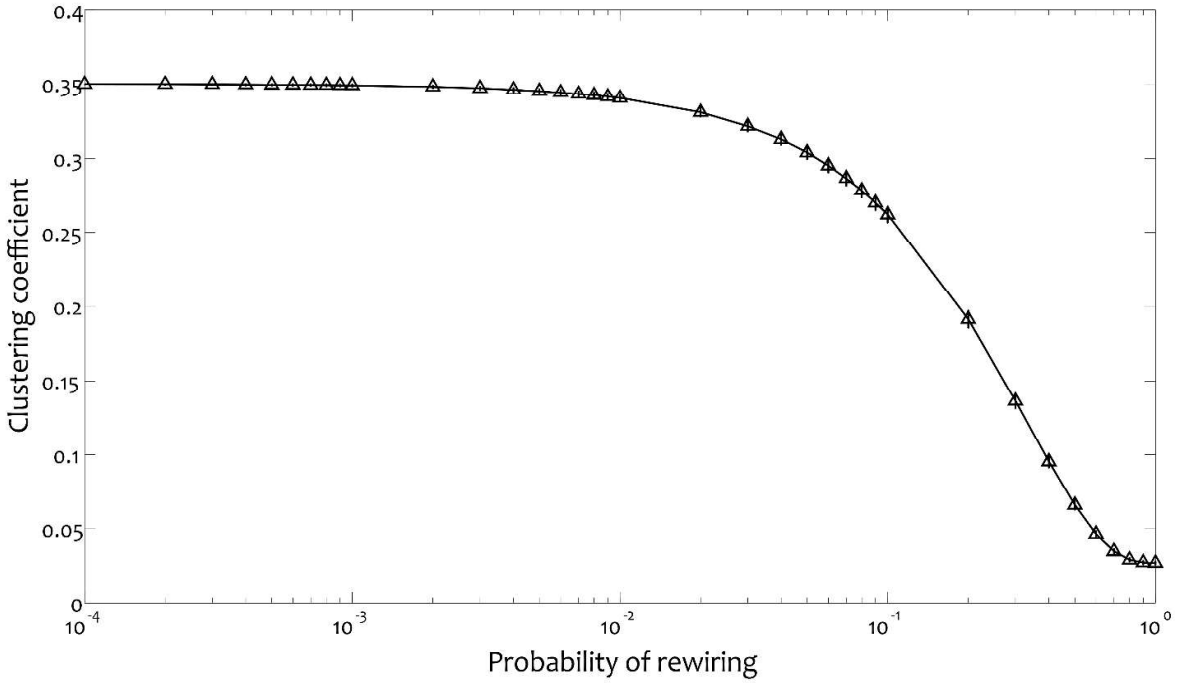

Figure C.2 : Response of average clustering coefficient to rewiring.

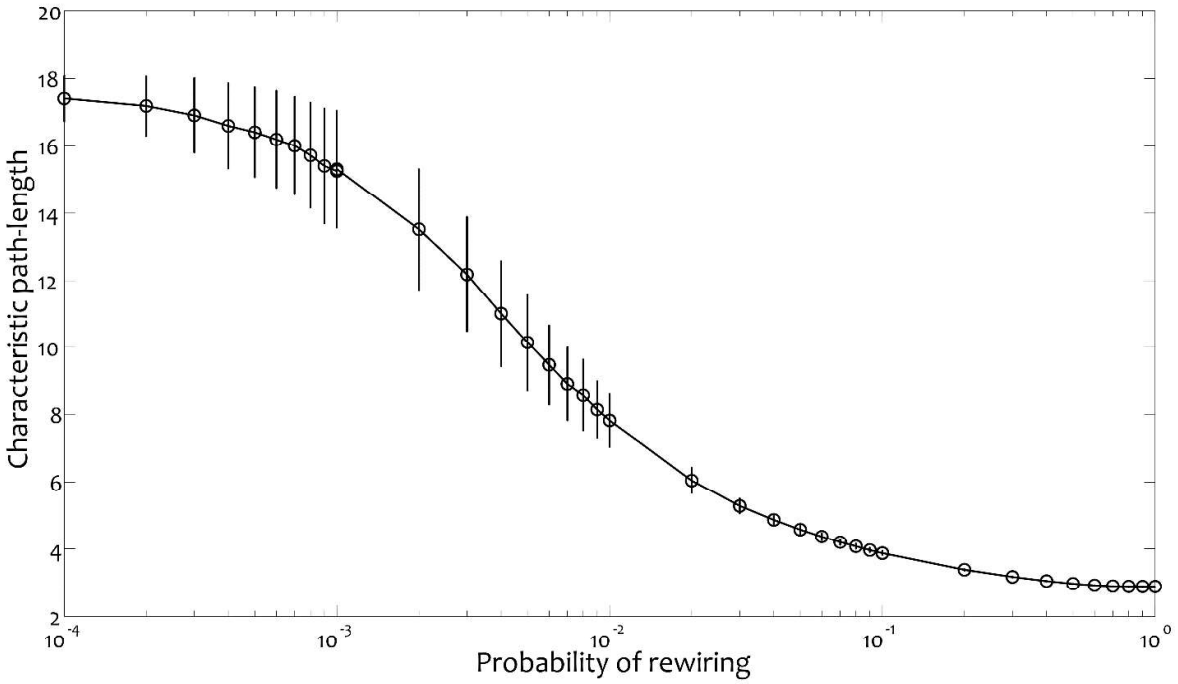

Figure C.3 : Response of characteristic path-length to rewiring.

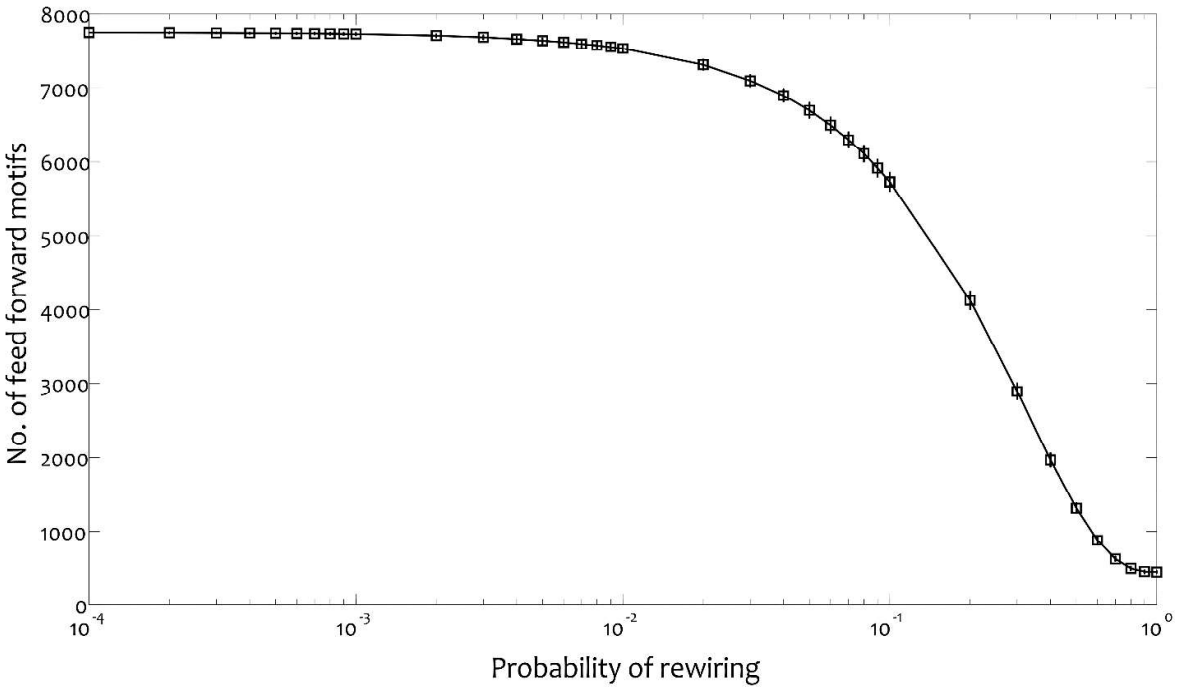

Figure C.4 : Response of number of feed forward motifs to rewiring.

Figure C.5 depicts the degree distribution of CeNN in comparison to its random controls (ER and DD) as well as distance constrained models (DCR and DCP).

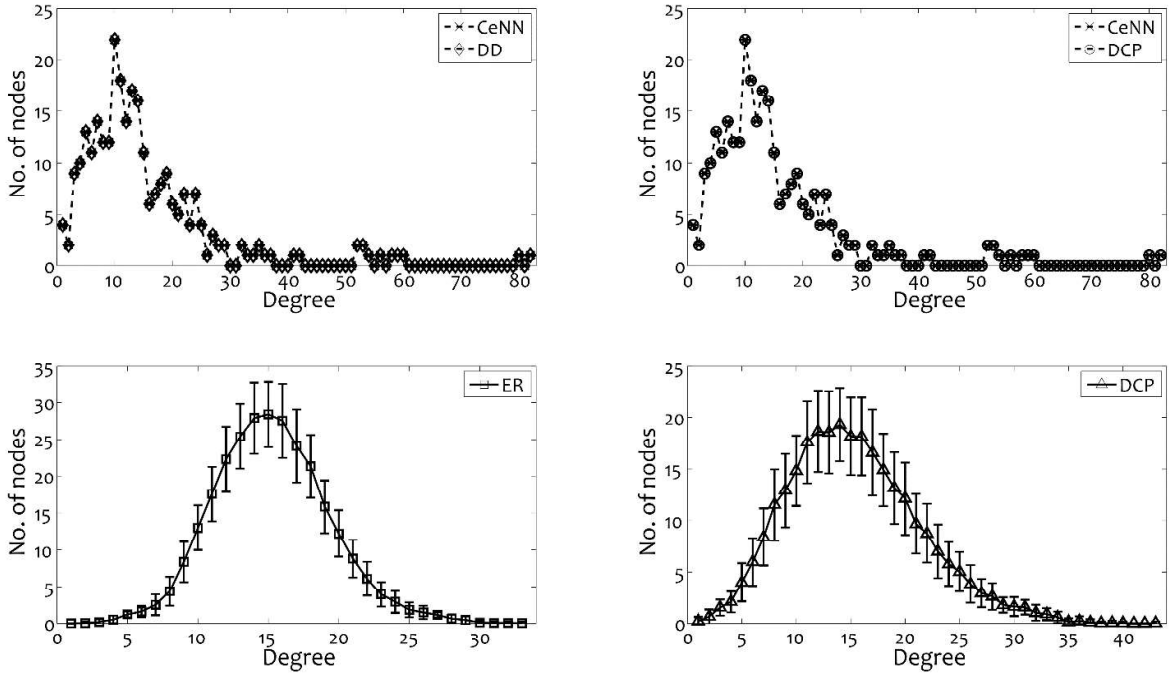

Figure C.5 : Degree distributions of CeNN, its controls and distance constrained models.

Table C.6 : Differential topological properties of distance constraint random (DCR) model at different values of α starting from an ER control. Data corresponding to Figure 5.6.

Exponent	**Average Clustering coefficient** $(\bar{C})$	**Characteristic path-length** (L)	**Number of driver neurons** (n_D)	**Number of feed forward motifs** (n_{FFM})
$\alpha = 0$ (ER)	0.032±0.001	2.968±0.007	0.26±0.441	610.55±37.59
$\alpha = 0.2$	0.032±0.002	3.048±0.026	13.75±2.536	563.91±29.212
$\alpha = 0.4$	0.033±0.001	3.068±0.026	15.70±2.866	612.19±33.902
$\alpha = 0.6$	0.039±0.002	3.14±0.028	15.24±2.934	721.21±38.011
$\alpha = 0.8$	0.048±0.002	3.211±0.042	14.66±2.952	875.83±40.081
$\alpha = 1.0$	0.064±0.003	3.334±0.044	13.62±2.784	1131.84±53.844
$\alpha = 1.2$	0.085±0.004	3.49±0.07	11.82±2.418	1447.24±65.112
$\alpha = 1.4$	0.108±0.004	3.689±0.099	9.37±2.299	1816.30±73.181
$\alpha = 1.6$	0.136±0.005	3.931±0.14	8.08±2.246	2231.32±87.442
$\alpha = 1.8$	0.169±0.006	4.185±0.266	7.23±2.287	2719.38±97.224
$\alpha = 2.0$	0.196±0.007	4.426±0.408	5.73±1.89	3114.38±108.00
$\alpha = 2.2$	0.227±0.008	4.589±0.617	5.09±1.682	3562.71±121.276
$\alpha = 2.4$	0.256±0.008	4.744±0.661	4.98±1.826	3985.73±121.322
$\alpha = 2.6$	0.28±0.008	4.726±0.709	4.46±1.72	4364.37±118.252
$\alpha = 2.8$	0.305±0.008	4.976±0.843	4.17±1.596	4738.90±124.48
$\alpha = 3.0$	0.326±0.008	5.138±0.856	3.93±1.725	5035.94±120.082
$\alpha \to \infty$ Cartesian	0.624	10.394	0	10153

Table C.7 : Differential properties of distance constraint synaptic plasticity (DCP) model at different values of α starting from DD control. Data corresponding to Figure 5.6.

Exponent	**Average Clustering coefficient** $(\bar{C})$	**Characteristic path-length** (L)	**Number of driver neurons** (n_D)	**Number of feed forward motifs** (n_{FFM})
$\alpha = 0$ (ER)	0.067±0.003	2.98±0.018	22.38±1.153	1699.56±57.496
$\alpha = 0.2$	0.047±0.002	3.116±0.024	20.37±2.427	1155.70±51.703
$\alpha = 0.4$	0.051±0.002	3.133±0.034	22.37±2.863	1379.11±61.456
$\alpha = 0.6$	0.058±0.003	3.182±0.033	23.66±2.503	1667.59±66.845
$\alpha = 0.8$	0.069±0.003	3.286±0.041	23.07±2.808	2026.05±72.395
$\alpha = 1.0$	0.086±0.004	3.423±0.055	21.51±3.422	2402.08±97.428
$\alpha = 1.2$	0.107±0.005	3.58±0.075	19.70±2.333	2832.55±89.72
$\alpha = 1.4$	0.131±0.005	3.79±0.112	17.62±2.112	3263.43±106.606
$\alpha = 1.6$	0.158±0.006	4.063±0.16	16.36±1.784	3726.71±109.069
$\alpha = 1.8$	0.186±0.006	4.384±0.317	15.89±1.377	4150.42±106.657
$\alpha = 2.0$	0.215±0.007	4.615±0.439	15.67±1.28	4597.74±114.656
$\alpha = 2.2$	0.241±0.007	4.829±0.576	15.55±1.167	5025.00±120.231
$\alpha = 2.4$	0.266±0.008	4.947±0.702	15.28±1.092	5391.46±114.656
$\alpha = 2.6$	0.288±0.009	5.256±0.902	15.05±0.947	5722.95±121.129
$\alpha = 2.8$	0.311±0.008	5.256±1.046	14.95±0.925	6084.32±118.954
$\alpha = 3.0$	0.328±0.009	5.395±1.002	15.10±0.959	6339.36±131.354
$\alpha \to \infty$ Cartesian	0.624	10.394	0	10153

Table C.8 : List of 34 driver neurons identified.

PDB	PVT	RMEL	RMER	SABVL	SABVR	SIADL	SIADR	SIAVL	SIAVR
SIBDL	SIBDR	SIBVL	SIBVR	VB11	VB3	VB4	VB5	VB6	VB7
VB8	VB9	VC2	VD10	VD11	VD12	VD13	VD3	VD4	VD5
VD6	VD7	VD8	VD9						

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