AI607 HW1 Report

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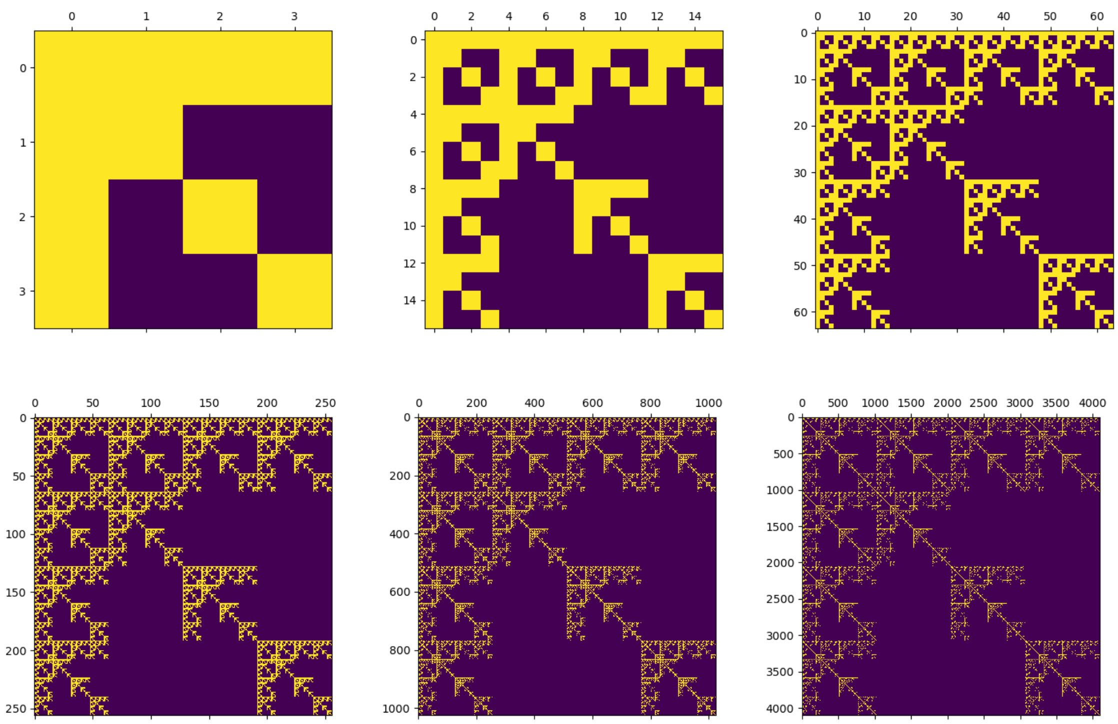
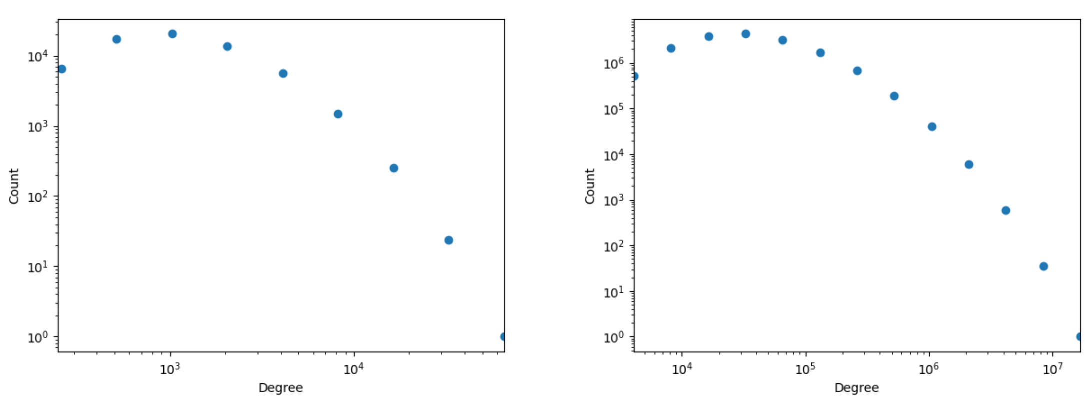
$$\mathrm{P}_1 = \mathrm{A} = \begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \end{pmatrix}$$

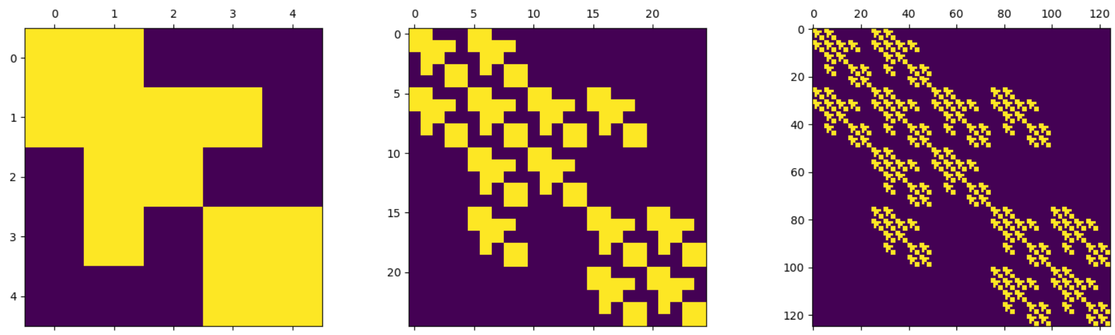


Degree distribution of P_8, P_{12}

The initial degrees of P_1, D_1 = [4, 2, 2, 2], clearly the degrees of P_k, D_k should be the k-order Kronecker product of D_1, $D_1 \otimes \ldots \otimes D_1$, where there are totally (k-1) Kronecker product operations. Thus, the elements in D_k should be 2^{i+k} for integer $0 \leq i \leq k$, where the count of 2^{i+k} is $\binom{k}{i} 3^{k-i}$.



$$P_1 = B = \begin{pmatrix} 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \end{pmatrix}$$



Degree distribution of P_6, P_8, P_{10}, P_{12}

The initial degrees of P_1, D_1 = [2, 4, 2, 3, 2], with similar analysis, we can get the elements in D_k should be $2^{k-i-j}3^i4^j = 2^{k+j-i}3^i$ for integer $0 \leq i + j \leq k$ and, where the count of $2^{k+j-i}3^i$ is $\frac{k!3^{k-i-j}}{i!j!(k-i-j)!}$.