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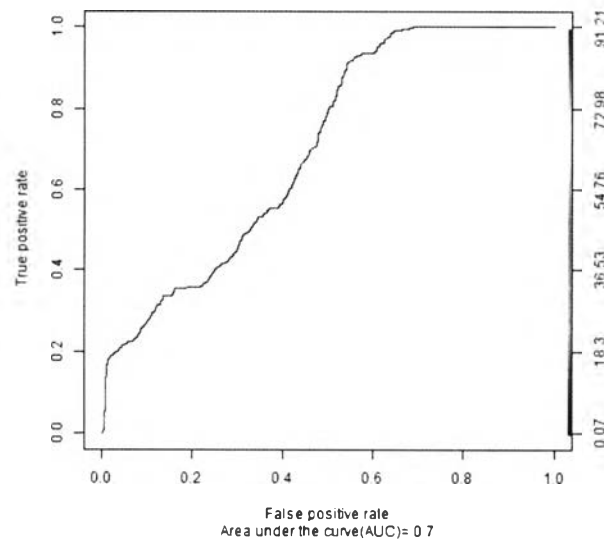
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APPENDICES

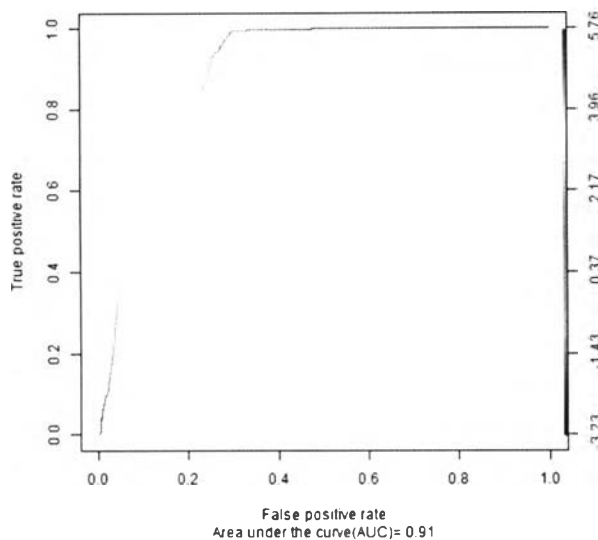
In this section, we showed the result of randomly chosen several attributes to develop the measure of disordered proteins affecting to scale-free network, M_{SF_Disp} and the measure of proteins affecting to scale-free network, M_{SF} in appendix A and appendix B, respectively. Appendices A and B consist of developing measure in balance data and imbalance data with their performance (AUC). All of appendices presented the value of AUC in our measures are higher than those measures generated from randomly chosen attributes. This implied that our measures, M_{SF_Disp} and M_{SF} have more efficient than those measures generated from randomly chosen attributes.

APPENDIX A: The performance (AUC) of ROC curve in the measure of disordered proteins affecting to scale-free network, M_{SF_Disp} with balance data and imbalance data



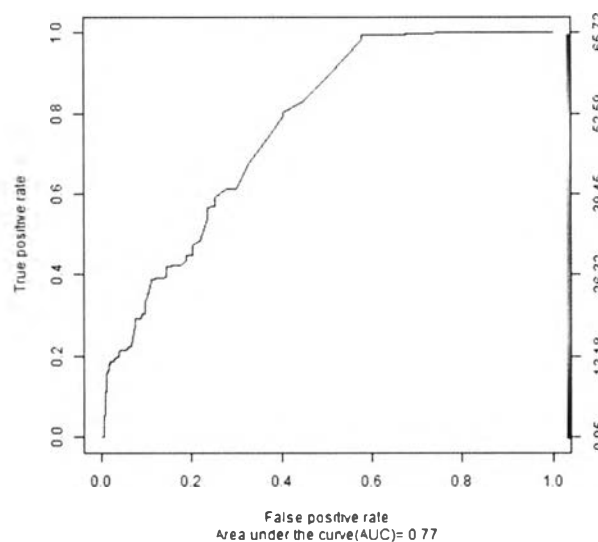
The performance (AUC) of ROC curve in balance data with the value of AUC is 0.70 in

$$\text{the } M_{SF_Disp}(i) = 1.45 \cdot \frac{k_i}{\langle k \rangle} + \frac{c_i}{\langle c \rangle}$$



The performance (AUC) of ROC curve in balance data with the value of AUC is 0.91 in

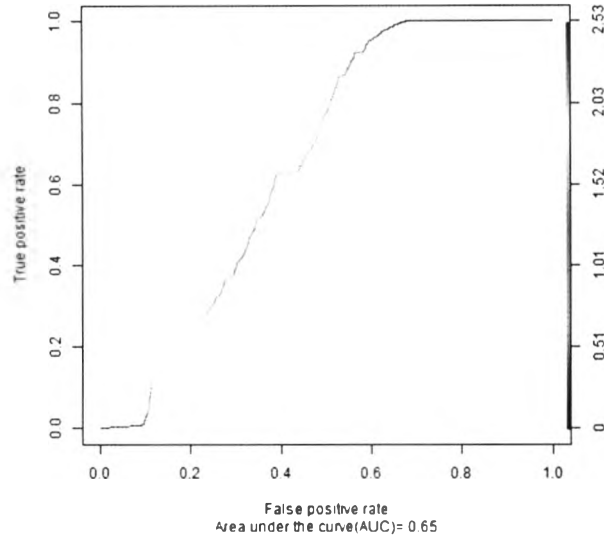
$$\text{the } M_{SF_Disp}(i) = 3.23 \cdot \text{sign}(R_i) + \frac{C_i}{\langle C \rangle}.$$



The performance (AUC) of ROC curve in balance data with the value of AUC is 0.77 in

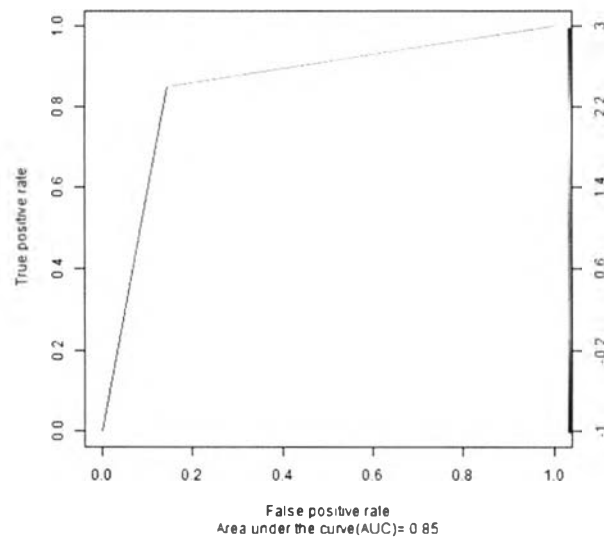
$$\text{the } M_{SF_Disp}(i) = \frac{k_i}{\langle k \rangle}.$$





The performance (AUC) of ROC curve in balance data with the value of AUC is 0.65 in

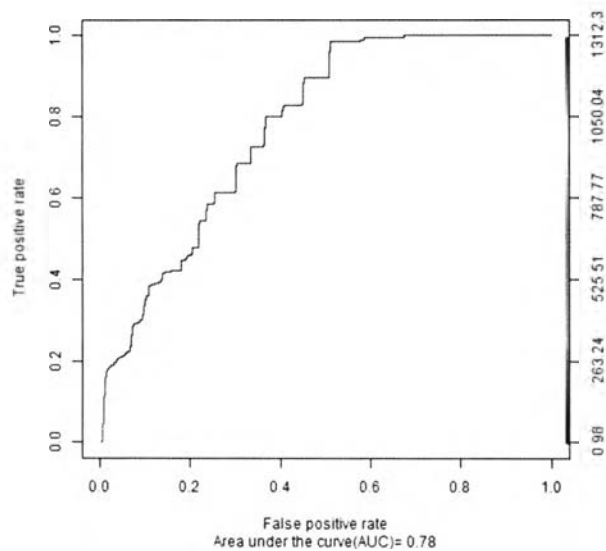
$$\text{the } M_{SF, Disp}(i) = \frac{c}{\langle c \rangle}$$



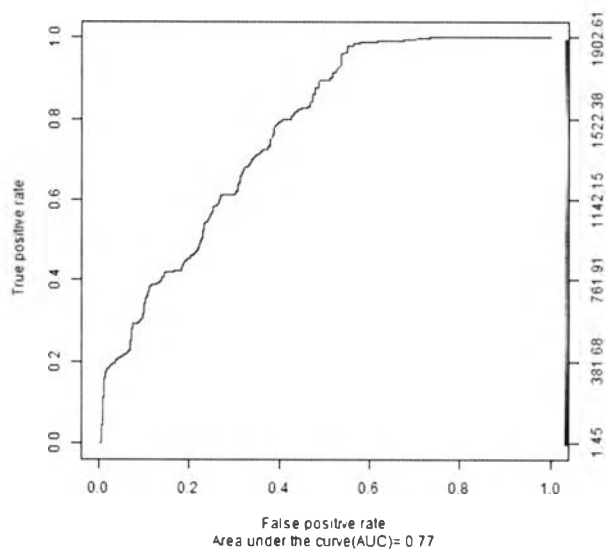
The performance (AUC) of ROC curve in balance data with the value of AUC is 0.85 in

$$\text{the } M_{SF, Disp}(i) = \text{sign}(R_i).$$



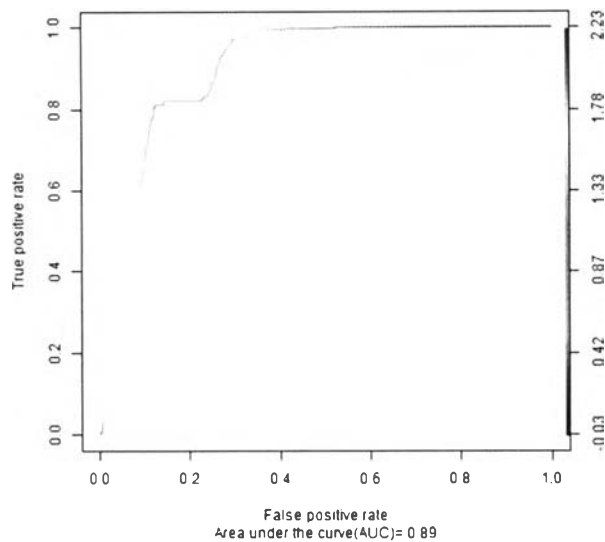


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.78 in the $M_{SF_{Disp}}(i) = k_i + 2.03 \cdot R_i$.

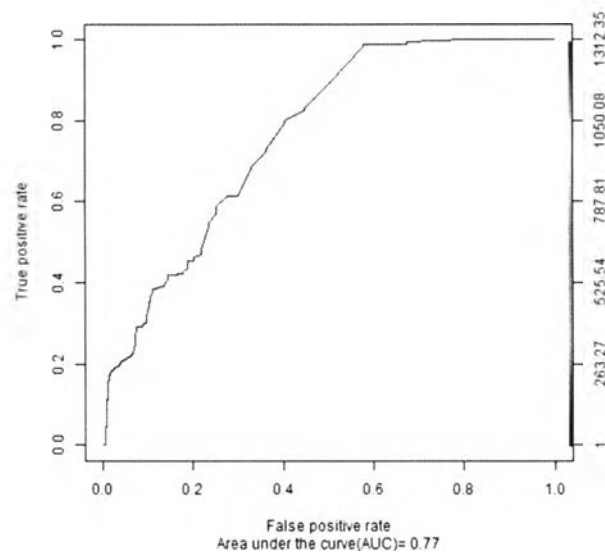


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.77 in the $M_{SF_{Disp}}(i) = 1.45 \cdot k_i + c_i$.



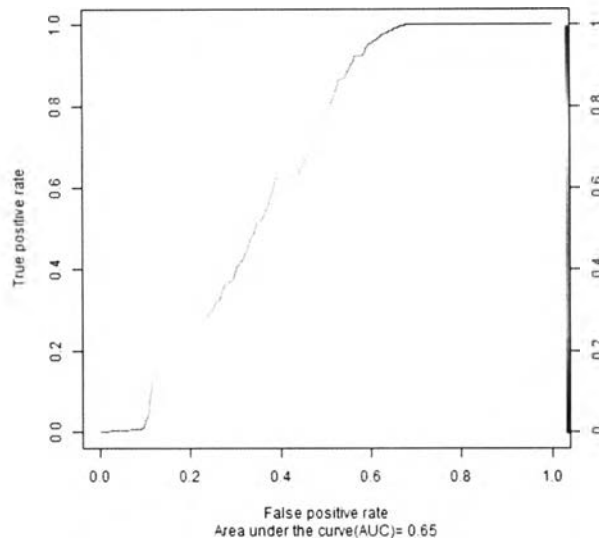


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.89 in the $M_{SF_{Disp}}(i) = 2.95 \cdot R_i + c_i$.

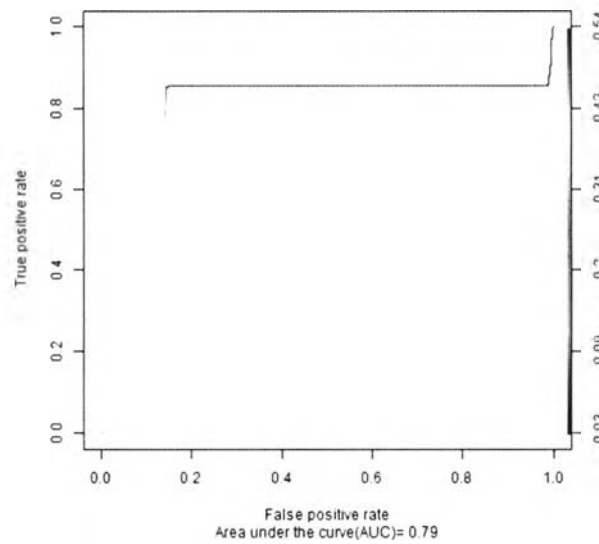


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.77 in the $M_{SF_{Disp}}(i) = k_i$.



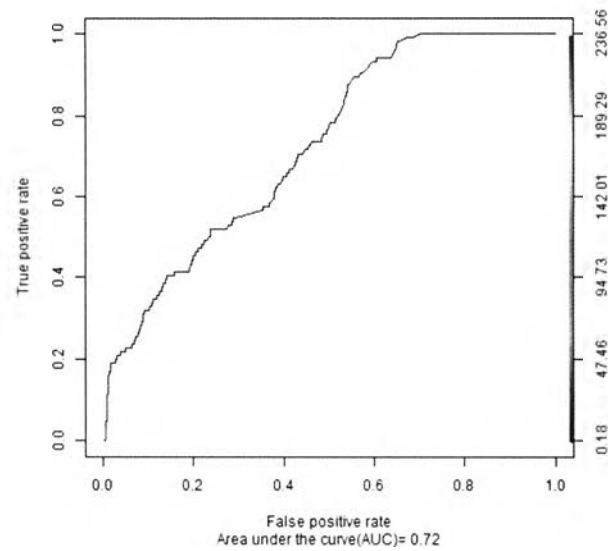


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.65 in the $M_{SF_Disp}(i) = c_i$.



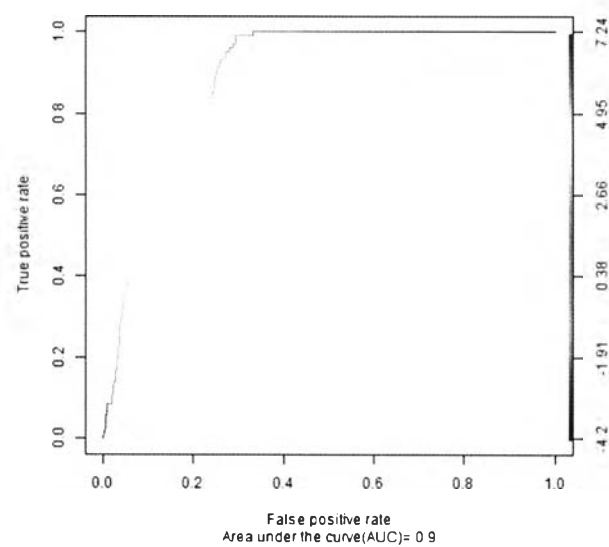
The performance (AUC) of ROC curve in balance data with the value of AUC is 0.79 in the $M_{SF_Disp}(i) = R_i$.





The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.72

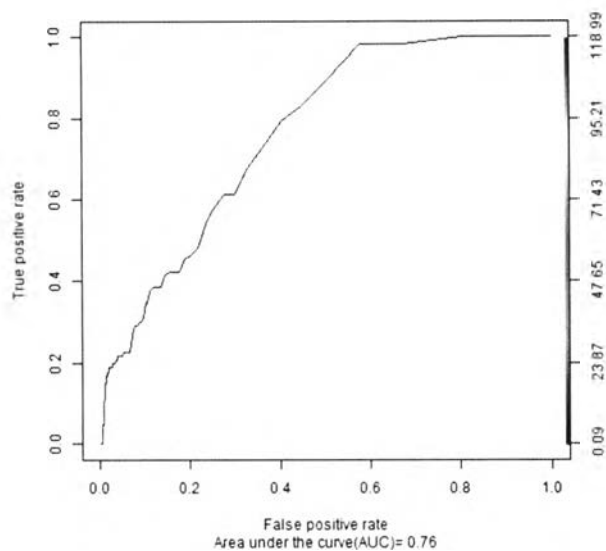
$$\text{in the } M_{sf_Disp}(i) = 2.00 \cdot \frac{k_i}{\langle k \rangle} + \frac{c_i}{\langle c \rangle}$$



The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.90

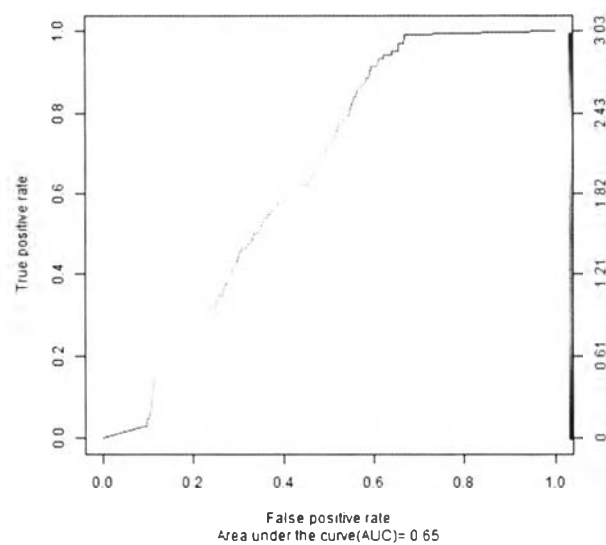
$$\text{in the } M_{sf_Disp}(i) = 4.20 \cdot \text{sign}(R_i) + \frac{c_i}{\langle c \rangle}$$





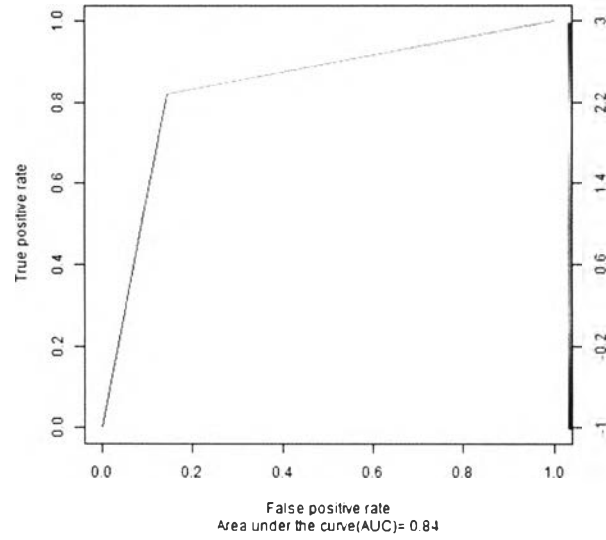
The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.76

$$\text{in the } M_{sf_{D_{k,p}}}(i) = \frac{k_i}{\langle k \rangle}$$

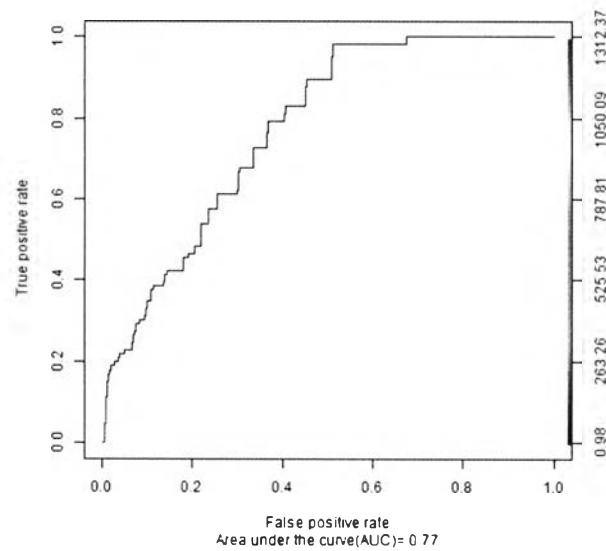


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.65

$$\text{in the } M_{sf_{D_{c,p}}}(i) = \frac{c_i}{\langle c \rangle}$$

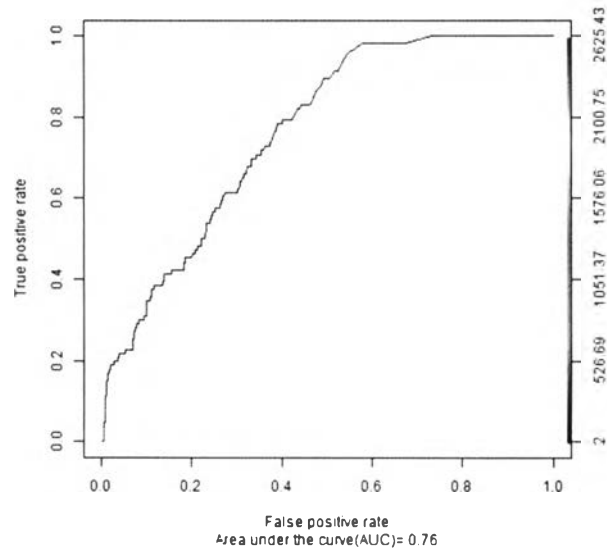


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.84 in the $M_{SF_Disp}(i) = sign(R_i)$.

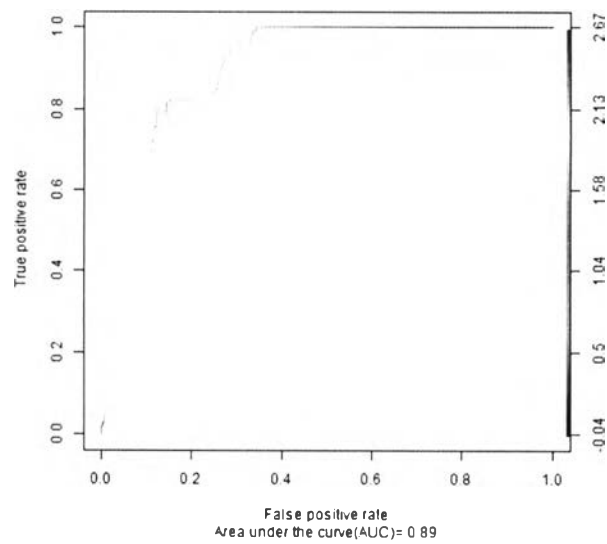


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.77 in the $M_{SF_Disp}(i) = k_i + 2.00 \cdot R_i$.



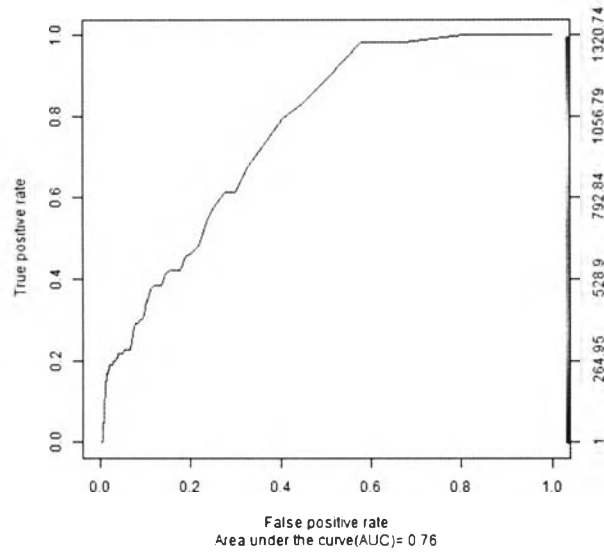


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.76 in the $M_{SF_{Disp}}(i) = 2.00 \cdot k_i + c_i$.

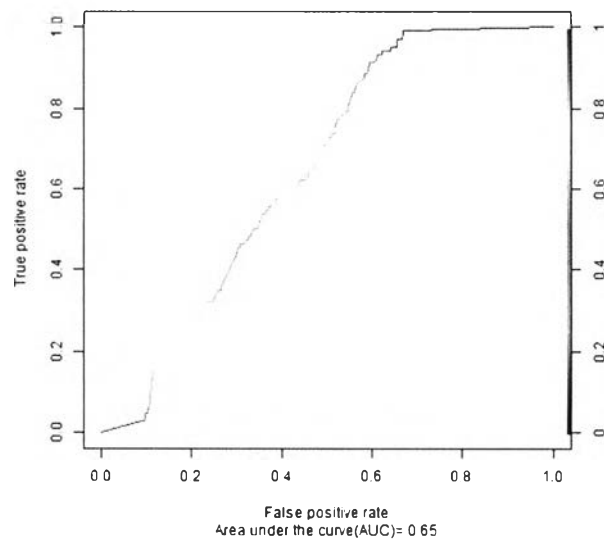


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.89 in the $M_{SF_{Disp}}(i) = 4.00 \cdot R_i + c_i$.



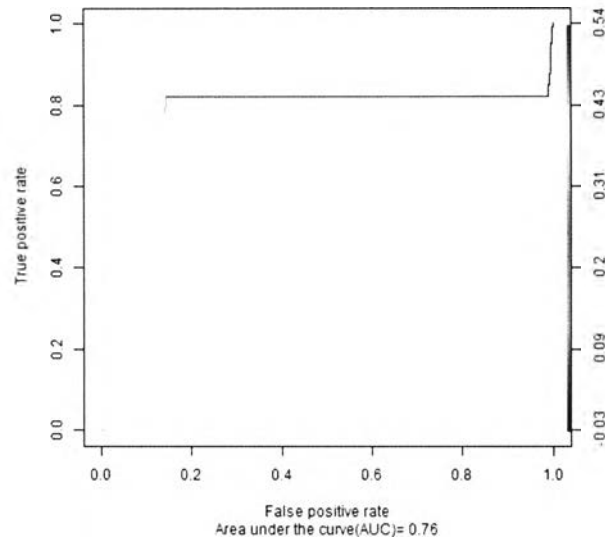


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.76 in the $M_{SF\ Disp}(i) = k_i$.



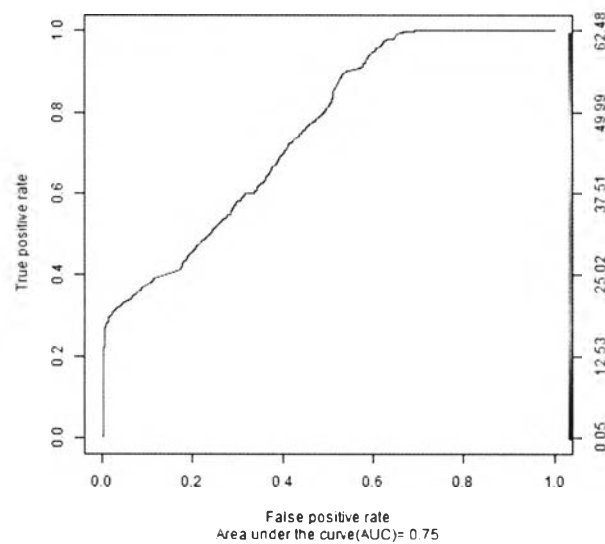
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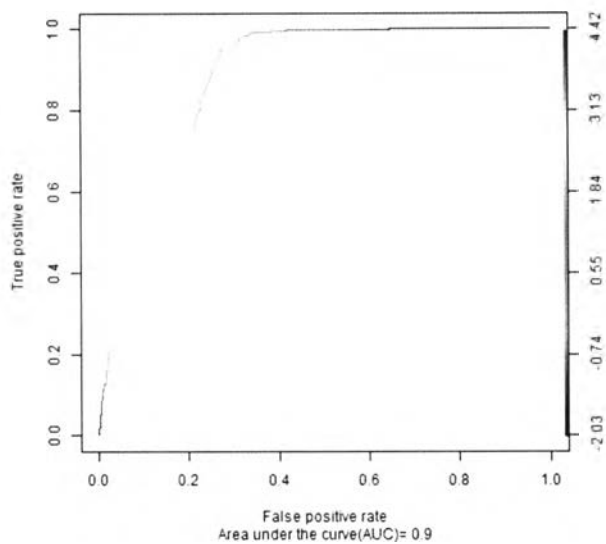


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.76 in the $M_{SF, Disp}(i) = R_i$.

APPENDIX B: The performance (AUC) of ROC curve in the measure of proteins affecting to scale-free network, M_{SF} with balance data and imbalance data

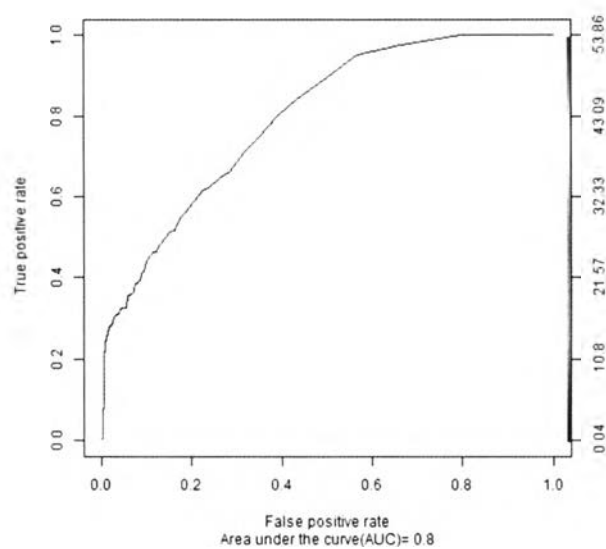


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.75 in the $M_{SF}(i) = 1.16 \cdot \frac{k_i}{\langle k \rangle} + \frac{c_i}{\langle c \rangle}$.



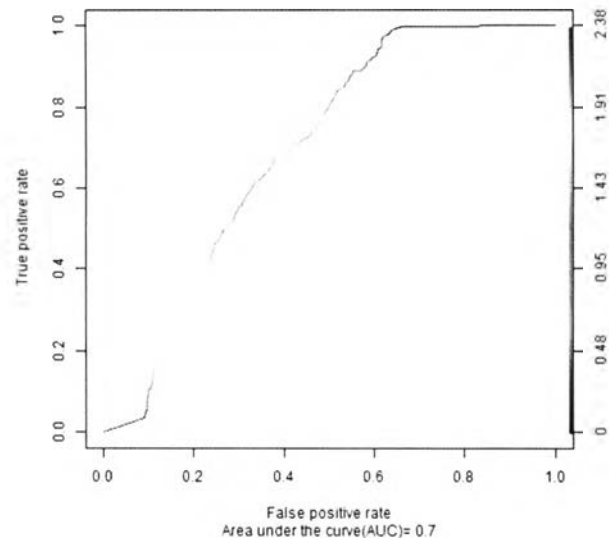
The performance (AUC) of ROC curve in balance data with the value of AUC is 0.90 in

$$\text{the } M_{sf}(i) = 2.03 \cdot \text{sign}(R_i) + \frac{c_i}{\langle c \rangle}$$



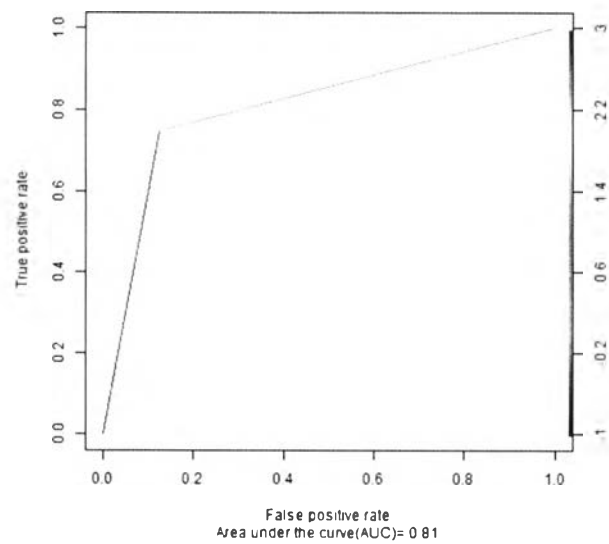
The performance (AUC) of ROC curve in balance data with the value of AUC is 0.80 in

$$\text{the } M_{sf}(i) = \frac{k_i}{\langle k \rangle}$$



The performance (AUC) of ROC curve in balance data with the value of AUC is 0.70 in

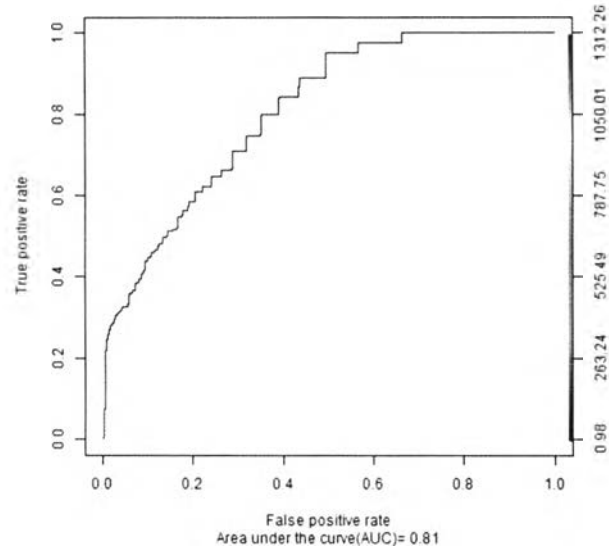
$$\text{the } M_{sr}(i) = \frac{c_i}{\langle c \rangle}.$$



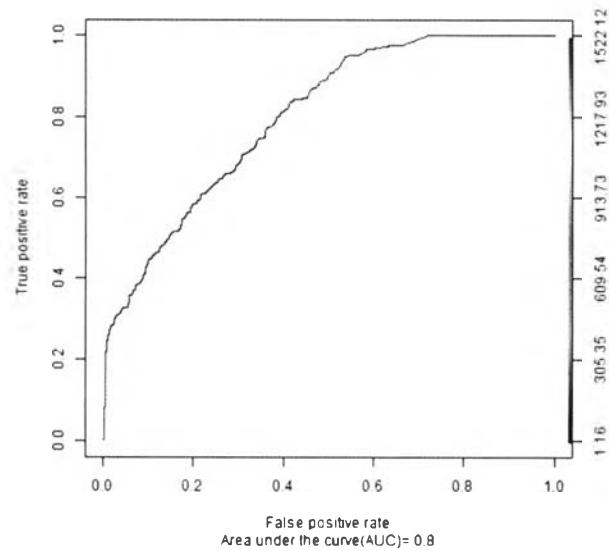
The performance (AUC) of ROC curve in balance data with the value of AUC is 0.81 in

$$\text{the } M_{sr}(i) = \text{sign}(R_i).$$



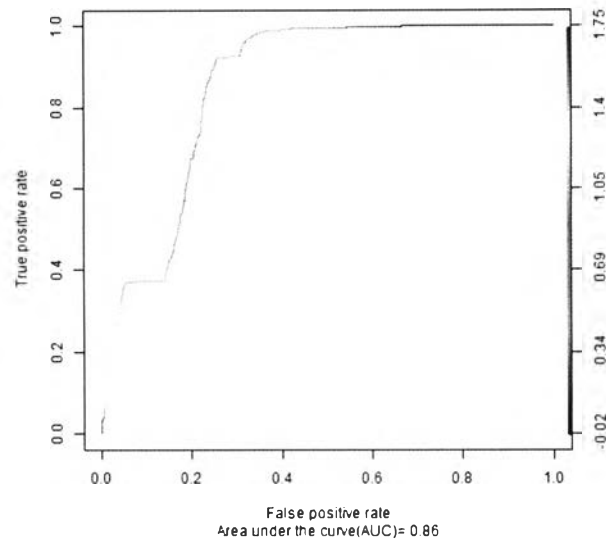


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.81 in the $M_{sf}(i) = k_i + 1.56 \cdot R_i$.

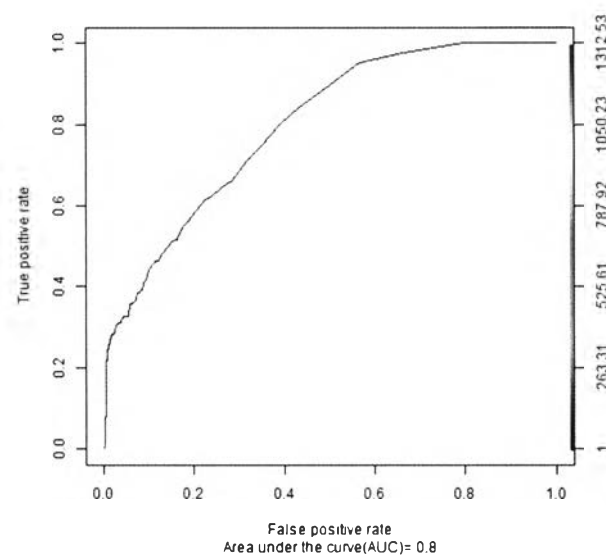


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.80 in the $M_{sf}(i) = 1.16 \cdot k_i + c_i$.

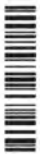


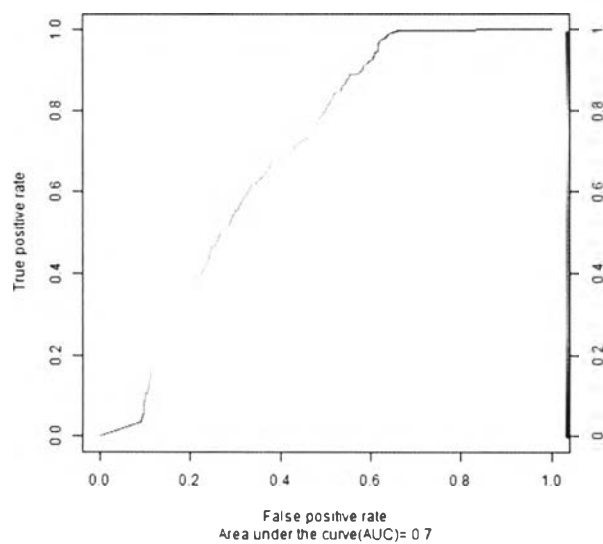


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.86 in the $M_{sf}(i) = 1.81 \cdot R_i + c_i$.

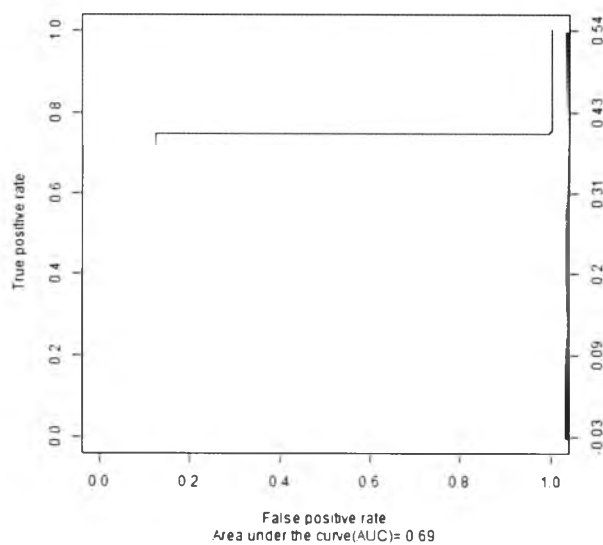


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.80 in the $M_{sf}(i) = k_i$.



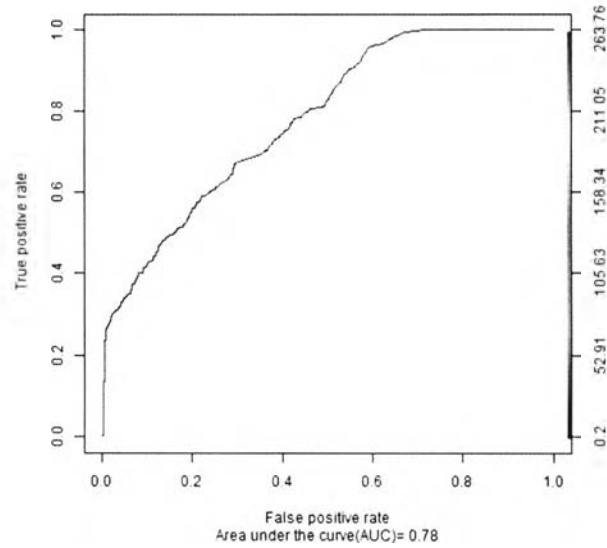


The performance (AUC) of ROC curve in balance data with the value of AUC is 0.70 in the $M_{SF}(i) = c_i$.



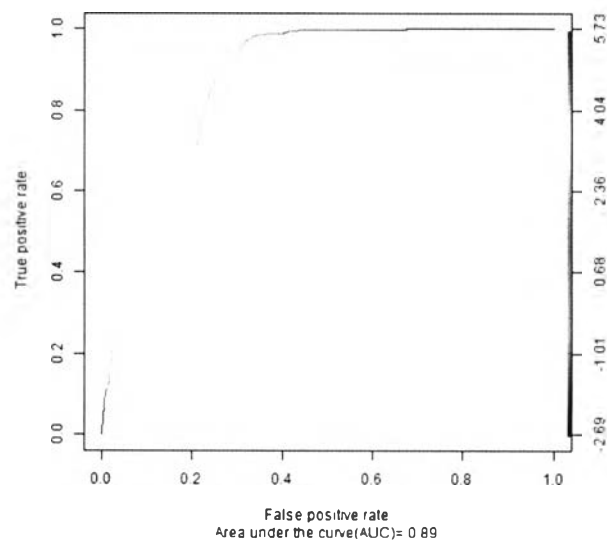
The performance (AUC) of ROC curve in balance data with the value of AUC is 0.69 in the $M_{SF}(i) = R$.





The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.78

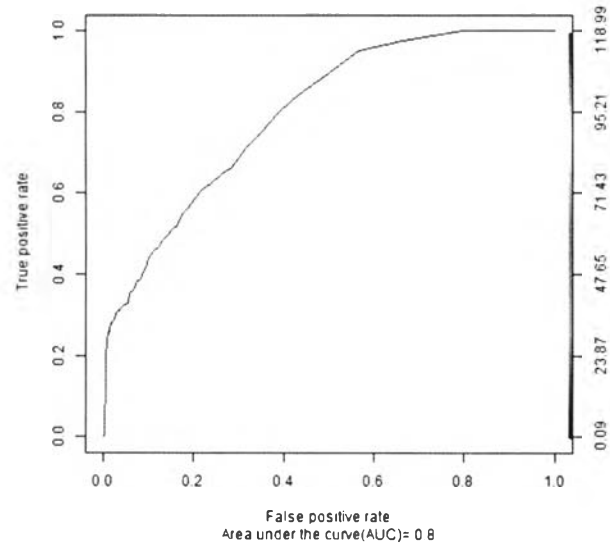
$$\text{in the } M_{sf}(i) = 2.23 \cdot \frac{k_i}{\langle k \rangle} + \frac{c_i}{\langle c \rangle}.$$



The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.89

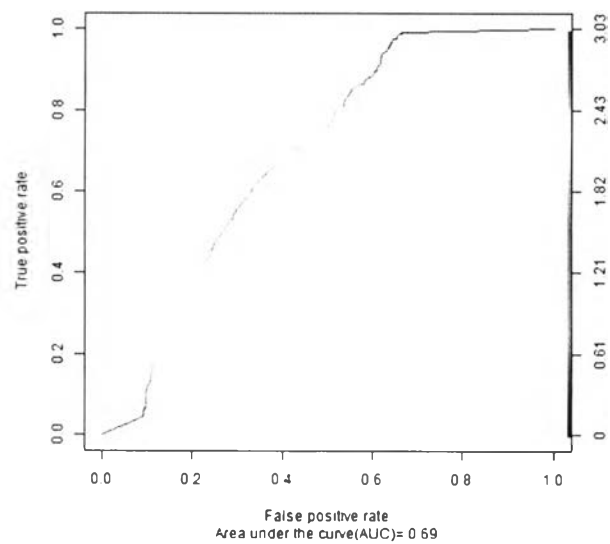
$$\text{in the } M_{sf}(i) = 2.69 \cdot \text{sign}(R_i) + \frac{c_i}{\langle c \rangle}.$$





The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.80

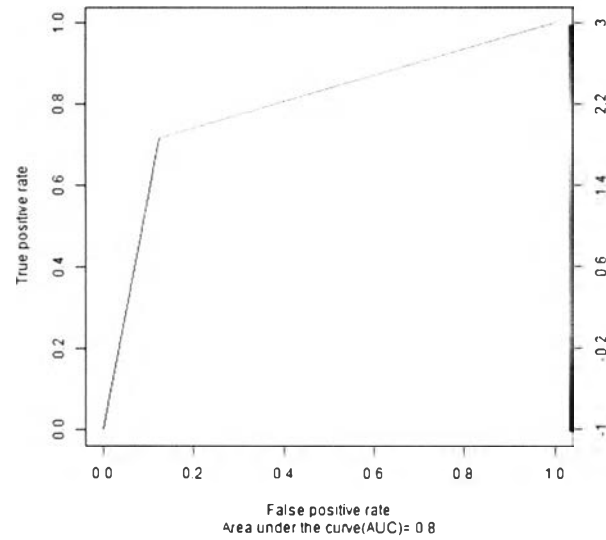
$$\text{in the } M_{sf}(i) = \frac{k_i}{\langle k \rangle}.$$



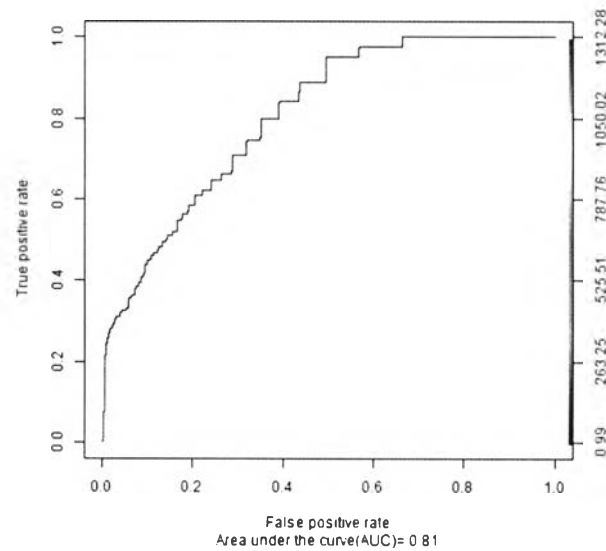
The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.69

$$\text{in the } M_{sf}(i) = \frac{c_i}{\langle c \rangle}.$$



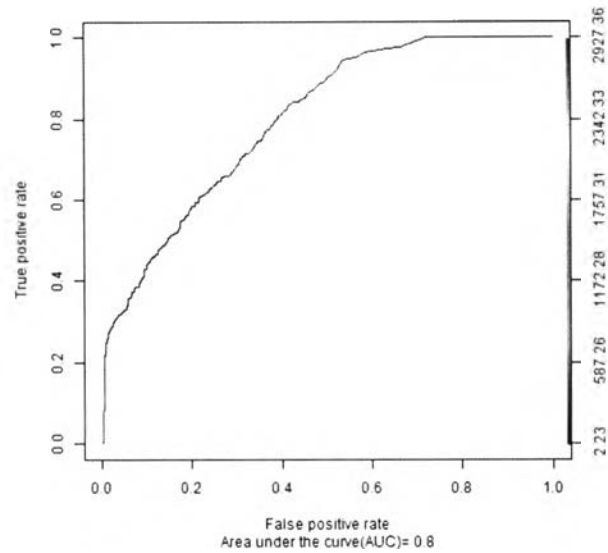


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.80 in the $M_{sf}(i) = \text{sign}(R_i)$.

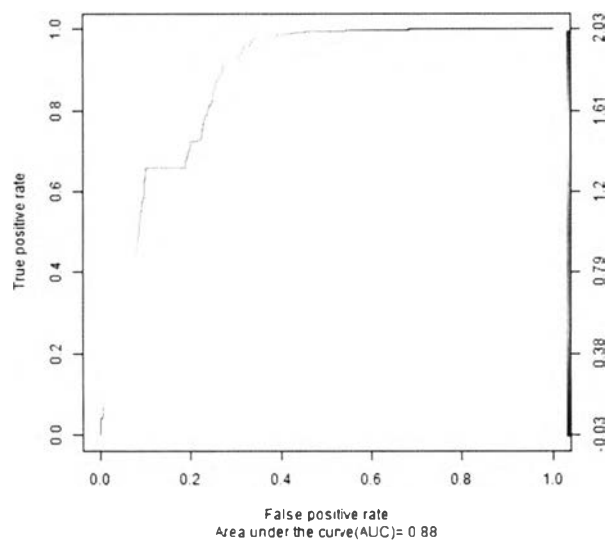


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.81 in the $M_{sf}(i) = k_i + 1.10 \cdot R_i$.



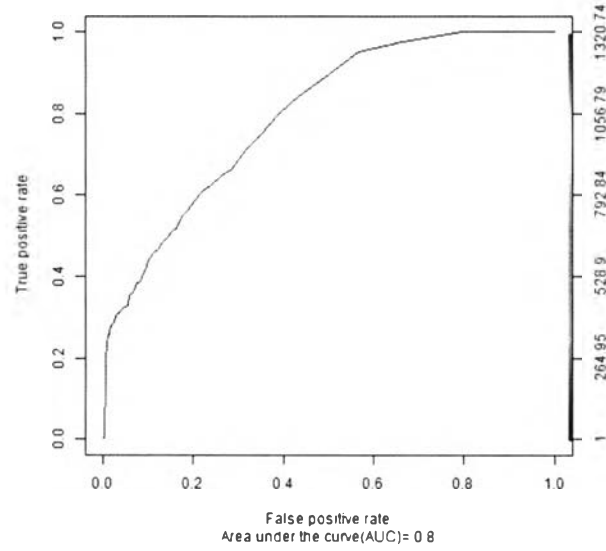


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.80 in the $M_{sf}(i) = 2.23 \cdot k_i + c_i$.

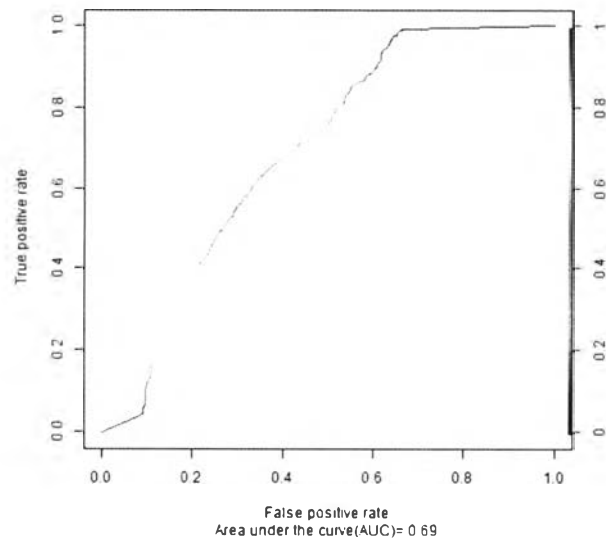


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.88 in the $M_{sf}(i) = 2.46 \cdot R_i + c_i$.



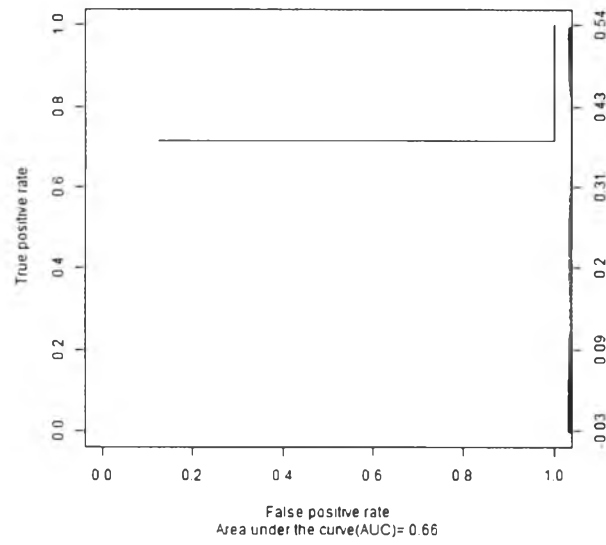


The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.80 in the $M_{sf}(i) = k_i$.



The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.69 in the $M_{sf}(i) = c_i$.





The performance (AUC) of ROC curve in imbalance data with the value of AUC is 0.66 in the $M_{sf}(i) = R_i$.



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Publication:

S. Kitsiranuwat, K. Plaimas and A. Suratane, "Characterizing Network Topology of Disordered Proteins in Protein Interaction Networks", Proceeding of International Conference in Mathematics and Applications (ICMA-MU 2016) Bangkok, Thailand 2016: 59-68.

