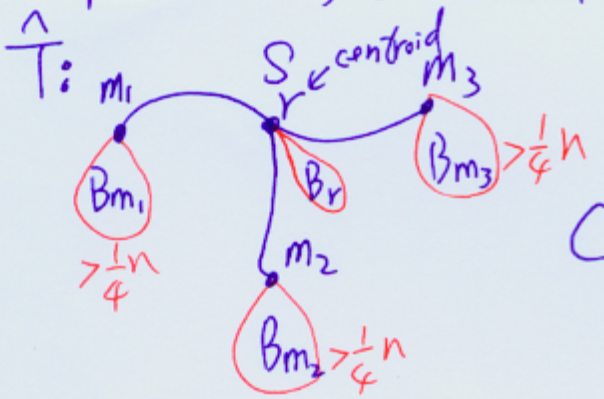
$\hat{T}$: an optimal MRCT; S: a minimal $\frac{1}{4}$-separator of $\hat{T}$ Kun-Mao Chao Oct., 2010



$$C(\hat{T}) \geq \frac{3}{2}n\sum_v d_{\hat{T}}(v,S) + \frac{3}{8}n^2 w(S)$$

$Y \in star(S)$

$\leftarrow d_Y(v,S) = d_G(v,S)$

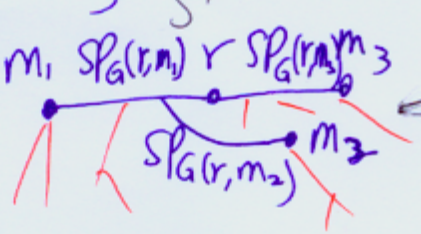
$$C(Y) \leq 2n\sum_v d_Y(v,S) + \frac{1}{2}n^2 w(S)$$

$$\leq 2n\sum_v d_{\hat{T}}(v,S) + \frac{1}{2}n^2 w(S)$$

$$\frac{C(Y)}{C(\hat{T})} \leq \max\left\{\frac{2n}{\frac{3}{2}n}, \frac{\frac{1}{2}n^2}{\frac{3}{8}n^2}\right\} = \frac{4}{3}.$$

The thing is that we don't have "S"!

Y'



$\leftarrow d_{Y'}(v,S') = d_G(v,S')$ $w(S') \leq w(S)$

$$C(Y') \leq 2n\sum_v d_G(v,S') + \frac{1}{2}n^2 w(S')$$

($\#> \frac{3}{4}n$) For Bm_1, Bm_2, Bm_3, and Br, $d_G(v,S') \leq \min\{d_G(v,m_1), d_G(v,m_2), d_G(v,m_3), d_G(v,r)\} \leq d_{\hat{T}}(v,S)$

($\#< \frac{1}{4}n$) For others, $d_G(v,S') \leq d_{\hat{T}}(v,S) + \frac{1}{2}w(S)$

$$C(Y') \leq 2n\sum_v d_G(v,S') + \frac{1}{2}n^2 w(S)$$

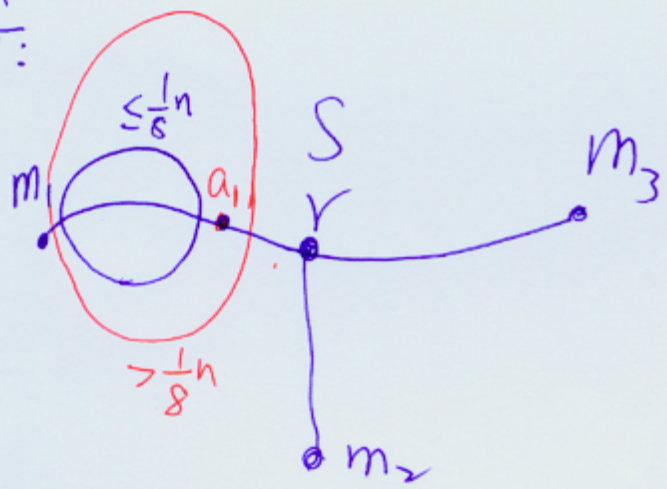
$$\times\tfrac{1}{4}n \quad \times\tfrac{1}{2}w(S)$$

$$\leq 2n\sum_v d_{\hat{T}}(v,S) + \frac{3}{4}n^2 w(S) \leq 2C(\hat{T})$$

↑!

Ku-Mao Chan
Oct., 2010

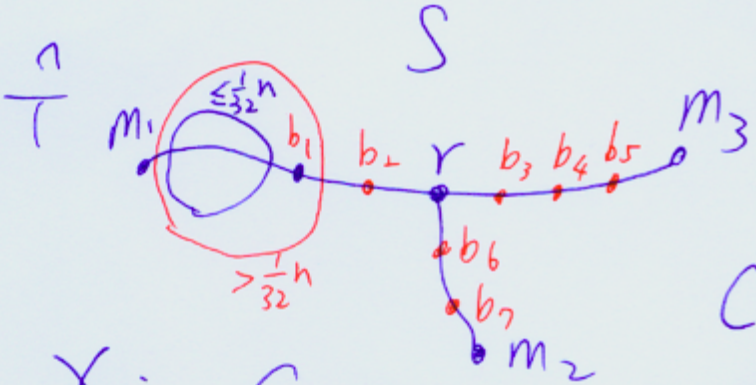
T:



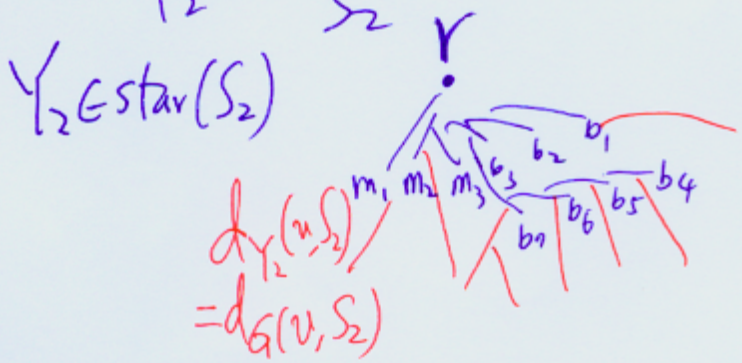
Y_1: S_1

$$C(Y_1) \le 2n \sum_v d_G(v,S_1) + \frac{1}{2}n^2 w(S_1)$$
$$\times \frac{1}{8}n \times \frac{1}{2} w(S)$$
$$\le 2n \sum_v d_T(v,S) + \frac{5}{8}n^2 w(S)$$
$$\frac{C(Y_1)}{C(T)} \le \max\left\{ \frac{2n}{\frac{3}{2}n}, \frac{\frac{5}{8}n^2}{\frac{3}{8}n^2} \right\} = \frac{5}{3}$$

T



Y_2: S_2



$$C(Y_2) \le 2n \sum_v d_G(v,S_2) + \frac{1}{2}n^2 w(S_2)$$
$$\times \frac{1}{32}n \times \frac{1}{2} w(S)$$
$$\le 2n \sum_v d_T(v,S) + \frac{17}{32}n^2 w(S)$$
$$\frac{C(Y_2)}{C(T)} \le \max\left\{ \frac{2n}{\frac{3}{2}n}, \frac{\frac{17}{32}n^2}{\frac{3}{8}n^2} \right\} = \frac{17}{12}$$

$$\Delta = \frac{1}{32} \Rightarrow \frac{4}{3} + \frac{8}{3} \times \frac{1}{32} = \frac{17}{12}$$
$$\Delta < \frac{1}{8} \Rightarrow \frac{4}{3} + \frac{8}{3} \times \frac{1}{8} = \frac{5}{3}$$

$\Delta = 10000$
$\Rightarrow \frac{4}{3} + \frac{8}{3} \times \frac{1}{10000} \approx \frac{4}{3}$

$$\frac{\frac{1}{2}n^2 + \Delta n^2}{\frac{3}{8}n^2} = \frac{4}{3} + \boxed{\frac{8}{3}\Delta}$$