Rank of Observation Matrix

$$\underset{2F\times N}{W} = \underset{2F\times 3}{M} \times \underset{3\times N}{S}$$

We know:

$$Rank(MS) \leq Rank(M) \qquad Rank(MS) \leq Rank(S)$$

⇨ $$Rank(MS) \leq \min(3,2F) \qquad Rank(MS) \leq \min(3,N)$$

⇨ $$Rank(W) \leq Rank(MS) \leq \min(3,N,2F)$$

Rank Theorem: $Rank(W) \leq 3$

[Tomasi 1992]