

Image Matting

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給一張照片，幫我去背~



剪刀剪一剪～



喫~再請幫我把毛髮全部剪出來 :D



別欺負我T^T

A Bayesian Approach To Digital Matting!

Yung-Yu Chuang, Brian Curless, David Salesin, and Richard Szeliski! CVPR 2001!

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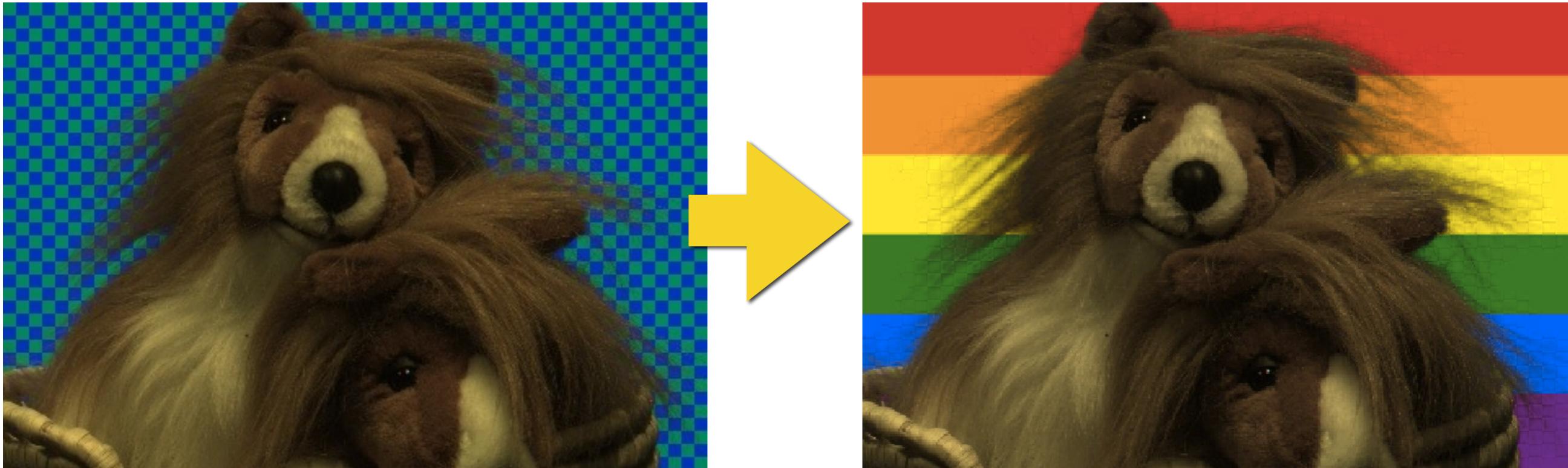
A Bayesian Approach To Digital Matting!

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需要使用者幫忙……



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需要使用者幫忙……

絕對確定他是前景



需要使用者幫忙……



不確定的範圍

Trimap



已知背景 Trimap



已知背景 Trimap



Trimap



unknown 區域

只要解決『不確定』的區域

$$C = \text{alpha} * F + (1-\text{alpha}) * B$$

- C : Input Image 想要去背的圖片 (Source)
- F : Foreground 前景 (向量 : R, G, B)
- B : Background 背景 (向量 : R, G, B)
- alpha : 前景和背景的**比例**是多少 , $0 \leq \text{alpha} \leq 1$
- 目標：已知 C , 解出 F 、 B 、 alpha

一個已知，解三個未知

$$C = \text{alpha} * F + (1 - \text{alpha}) * B$$

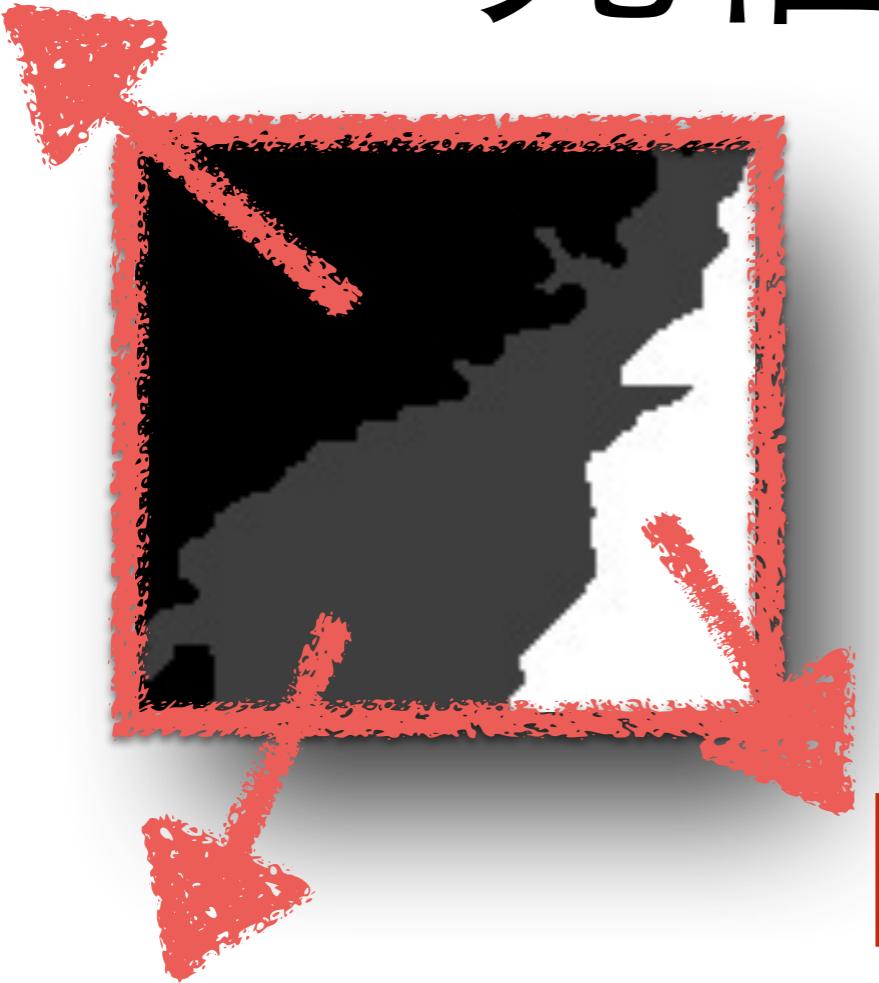
How ?

先框一個區域



先框一個區域

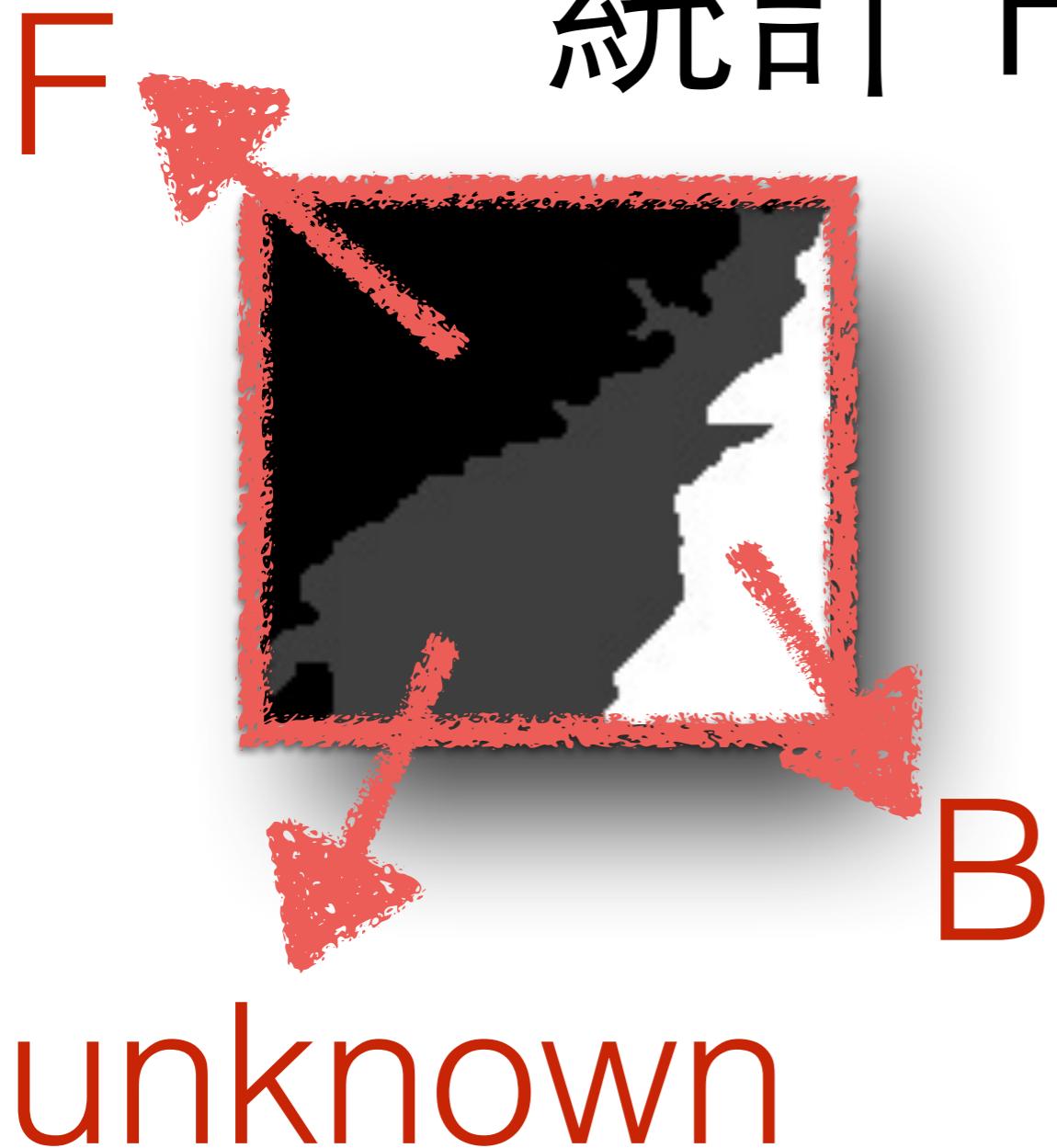
F



B

unknown

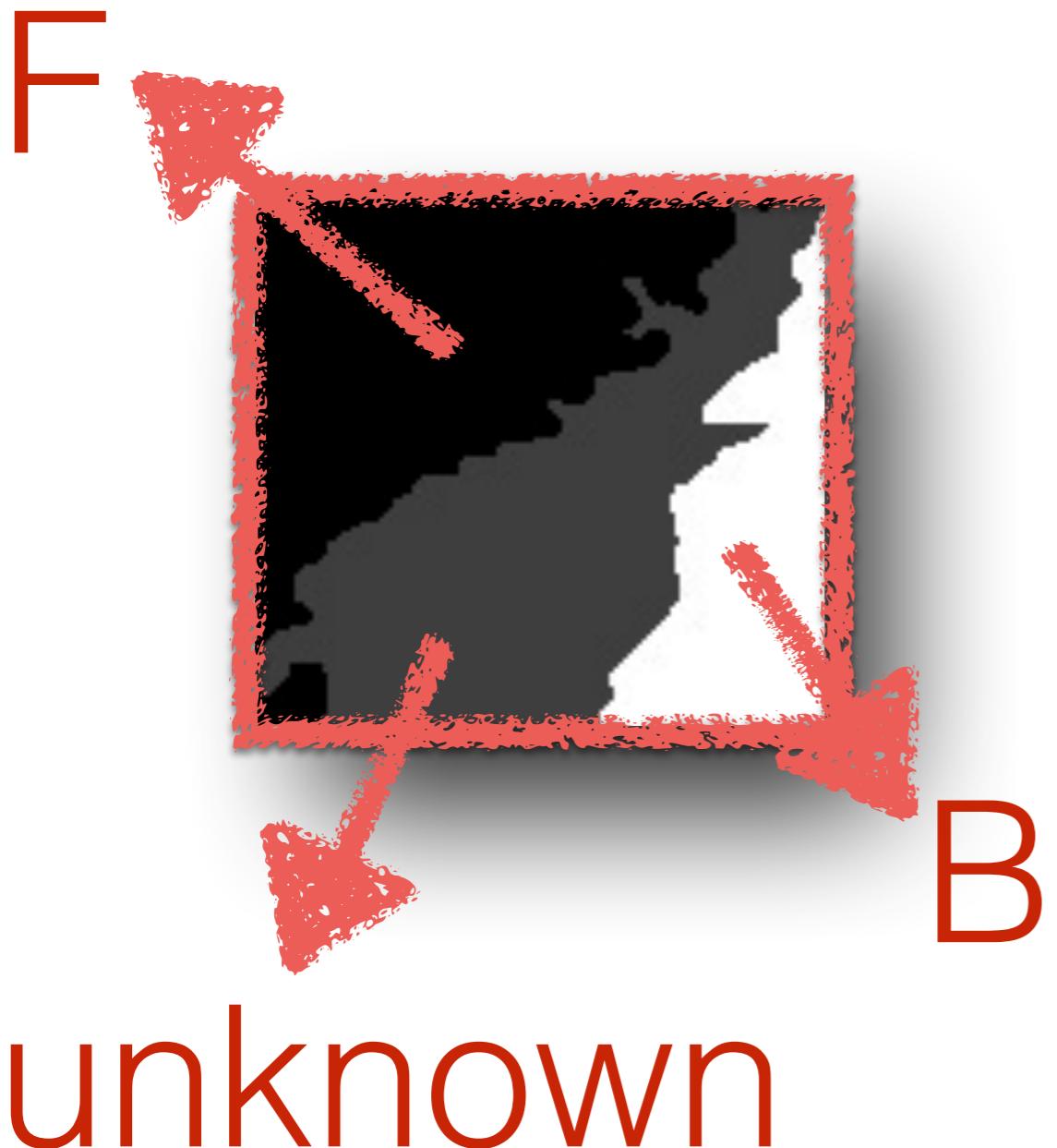
統計 F & B



找出F、B的mean

找出F、B的
Covariance Matrix

Model F & B Distribution



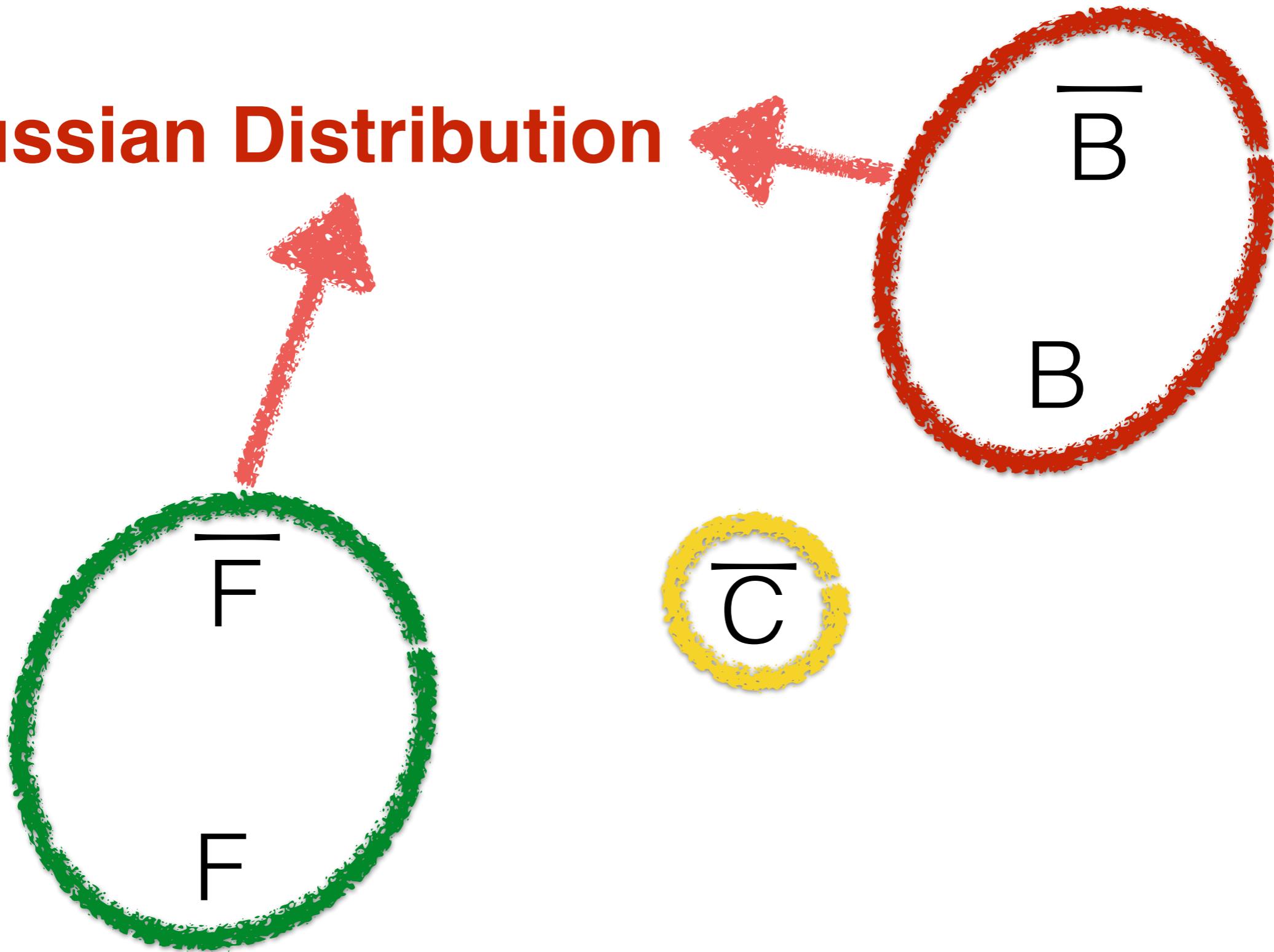
找出F、B的mean

找出F、B的
Covariance Matrix

$$\text{Gaussian} : \frac{1}{\sigma\sqrt{2\pi}} \exp\left(-\frac{(x - \mu)^2}{2\sigma^2}\right)$$

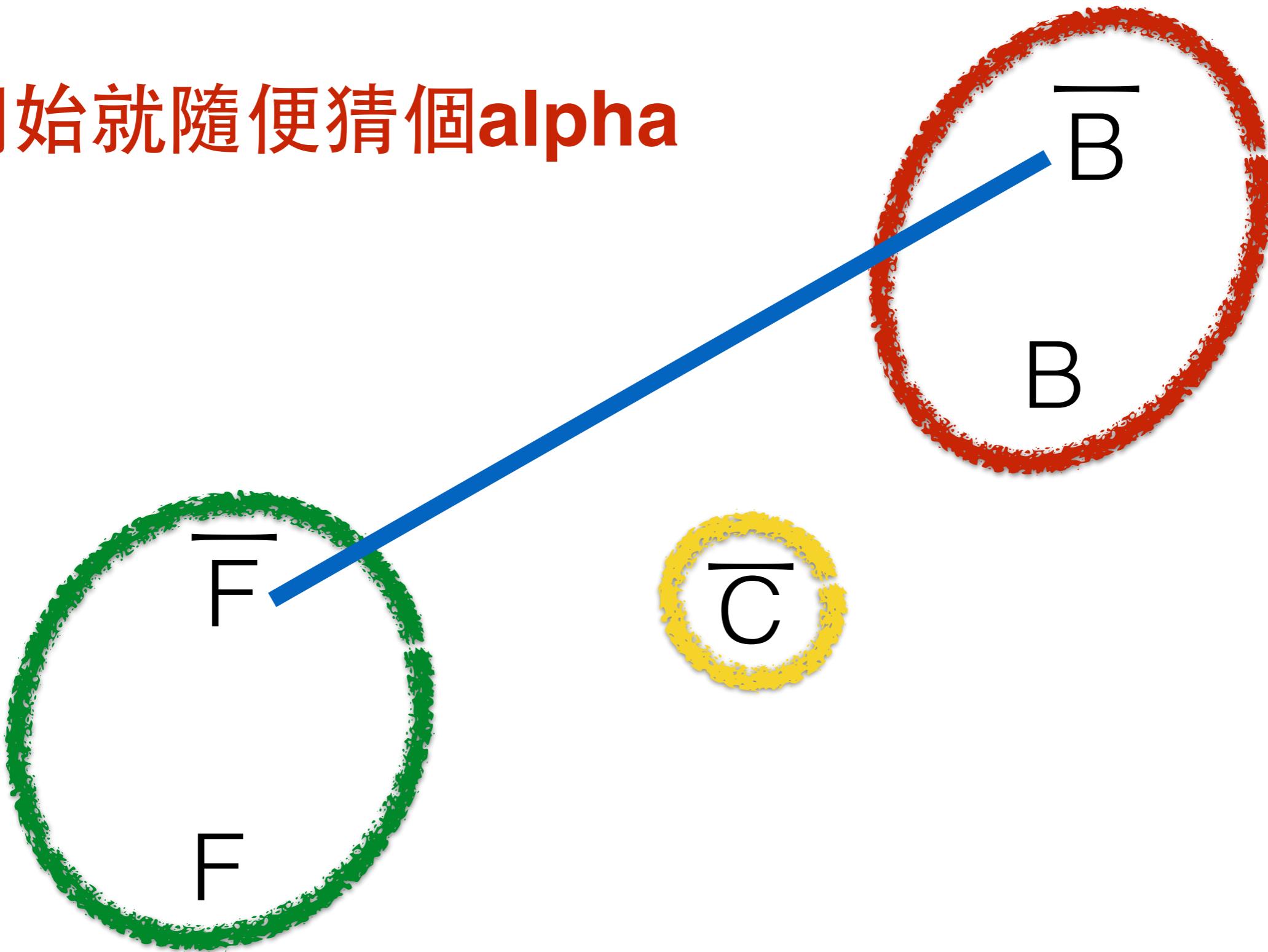
Beyasian的精神：假設

Gaussian Distribution



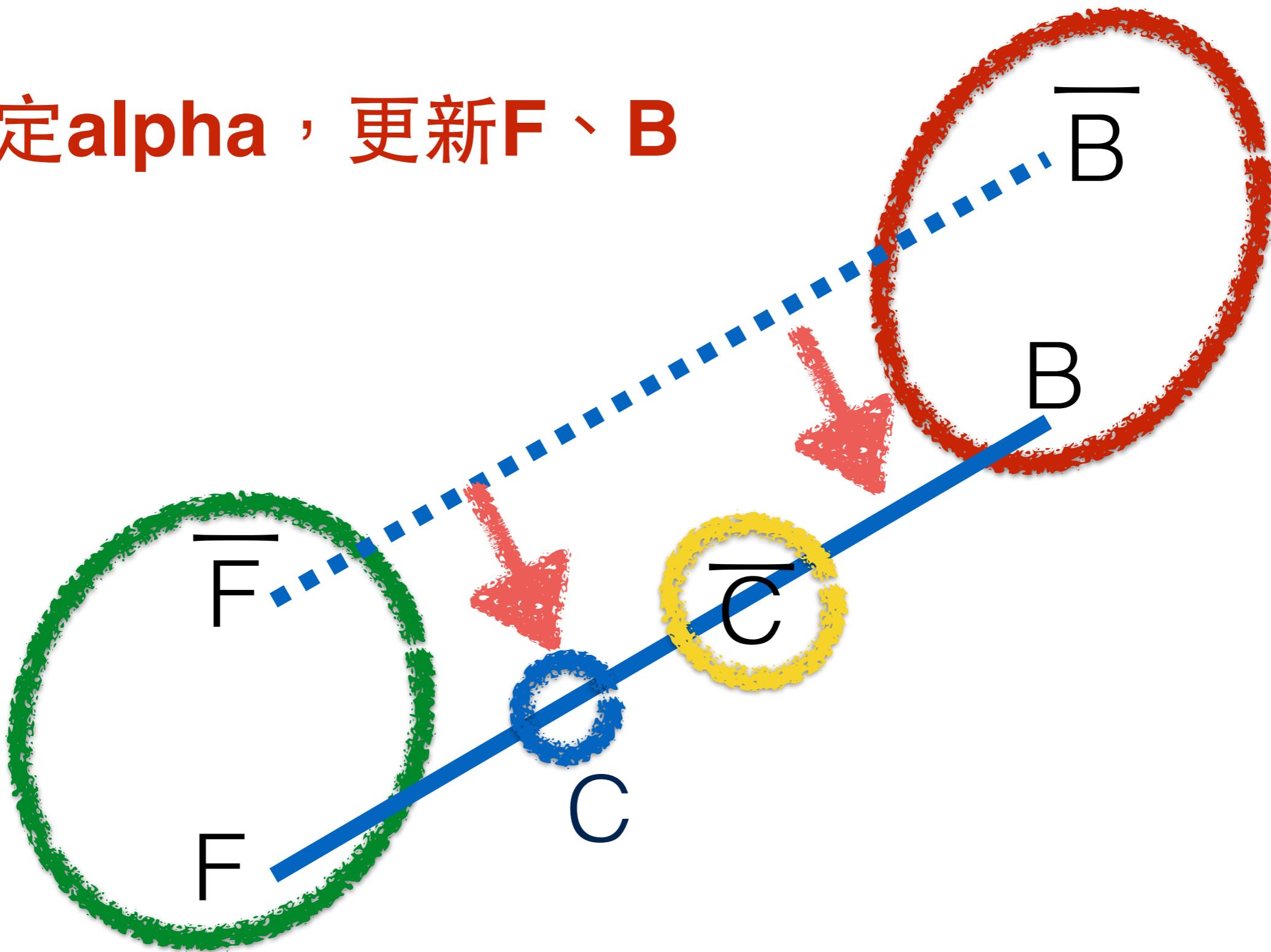
步驟一，固定alpha

一開始就隨便猜個alpha



步驟二，更新F、B

固定alpha，更新F、B



步驟二，更新F、B

固定alpha，更新F、B

$$\begin{bmatrix} \Sigma_F^{-1} + I\alpha^2/\sigma_C^2 & I\alpha(1-\alpha)/\sigma_C^2 \\ I\alpha(1-\alpha)/\sigma_C^2 & \Sigma_B^{-1} + I(1-\alpha)^2/\sigma_C^2 \end{bmatrix} \begin{bmatrix} F \\ B \end{bmatrix}$$
$$= \begin{bmatrix} \Sigma_F^{-1}\bar{F} + C\alpha/\sigma_C^2 \\ \Sigma_B^{-1}\bar{B} + C(1-\alpha)/\sigma_C^2 \end{bmatrix}$$

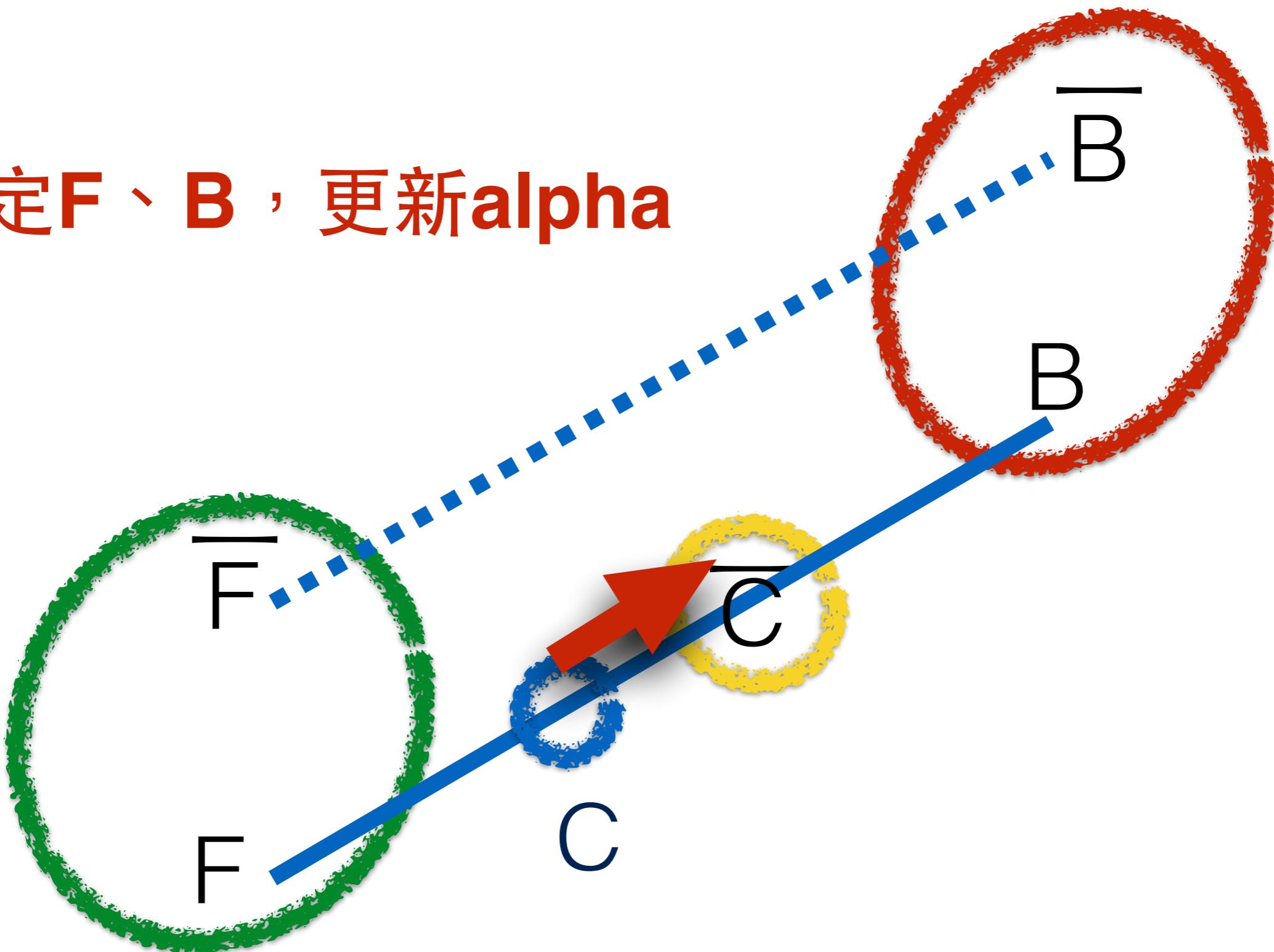
F

R

B

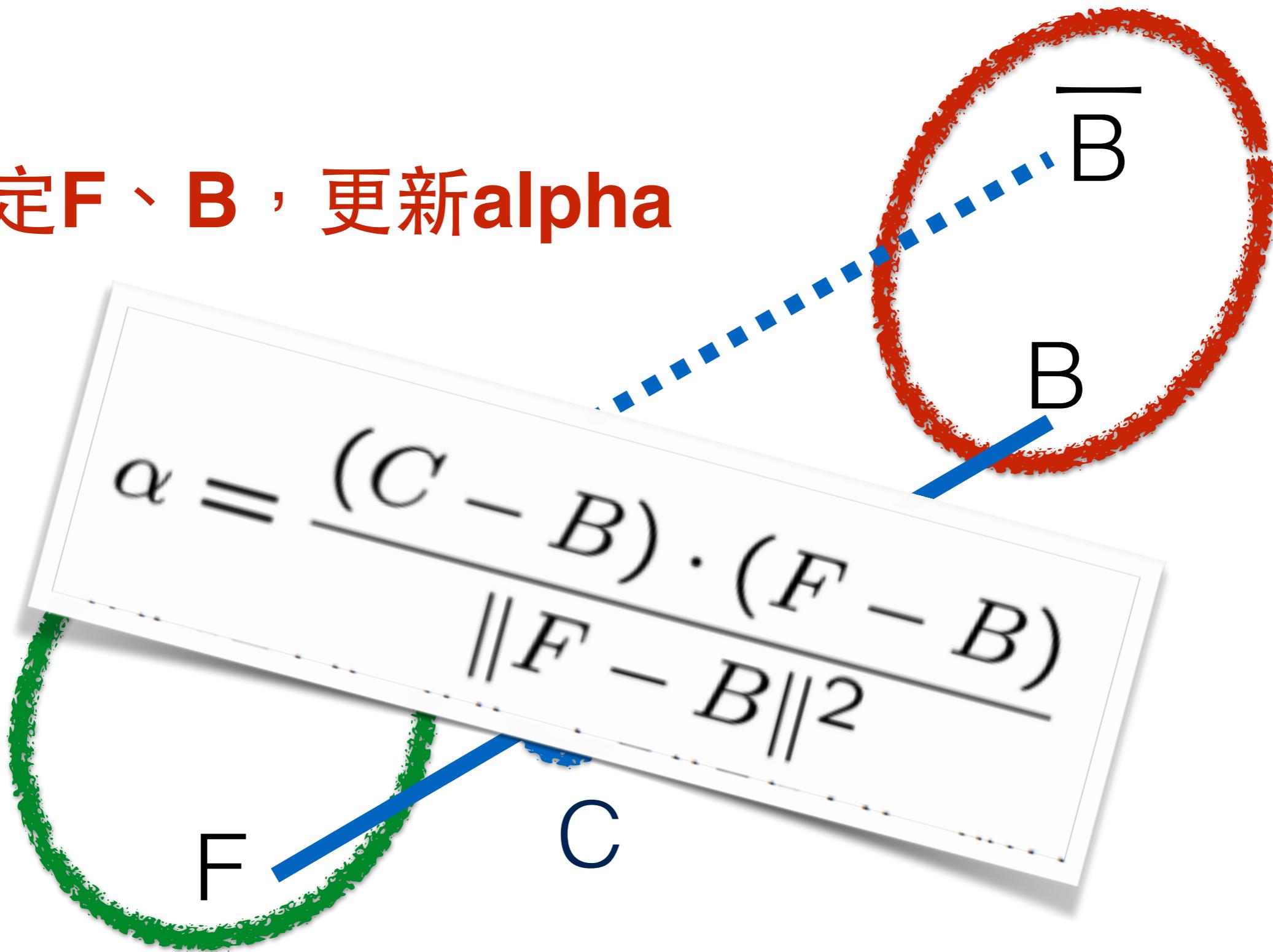
步驟三，更新alpha

固定F、B，更新alpha



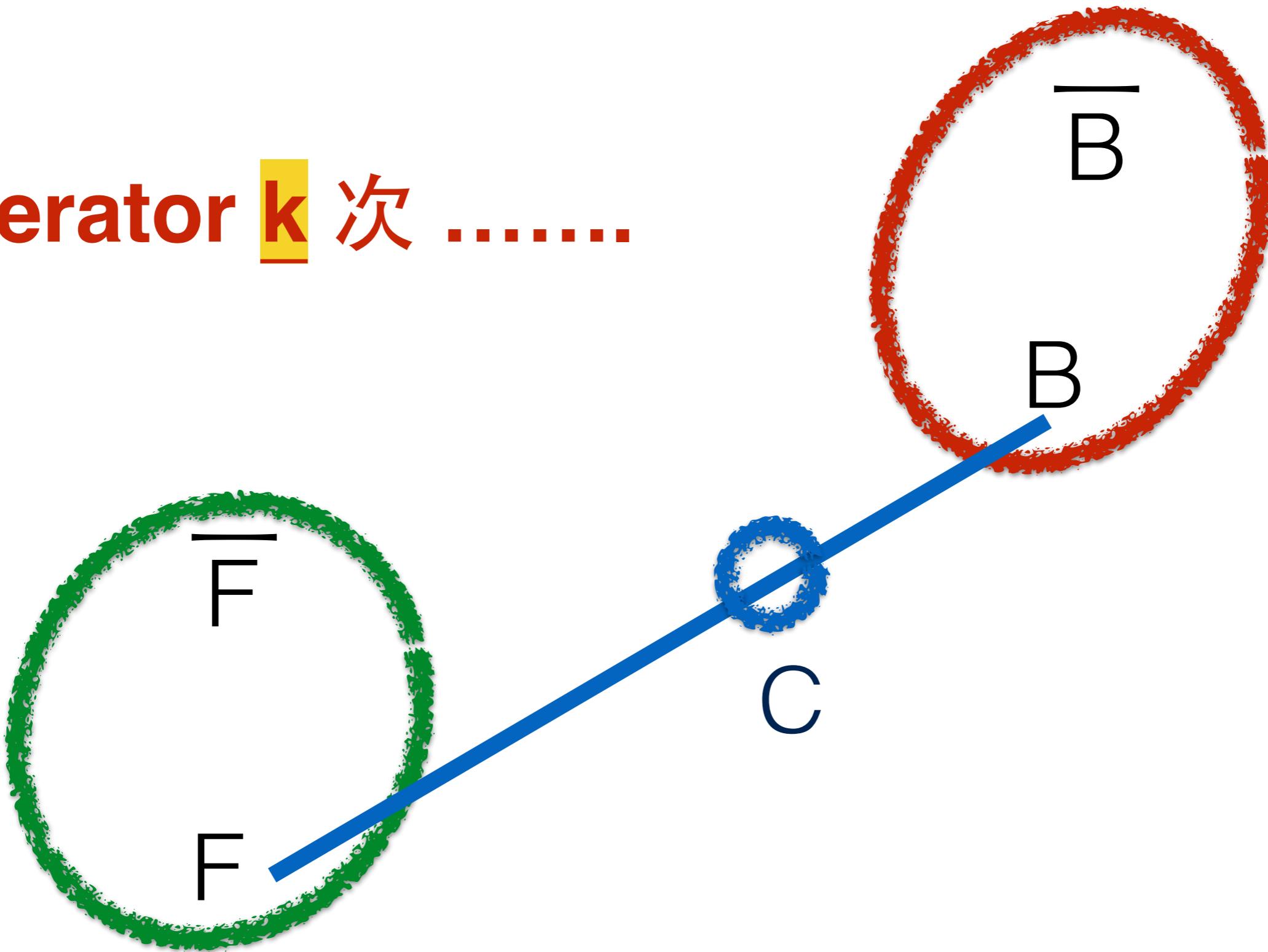
步驟三，更新alpha

固定F、B，更新alpha

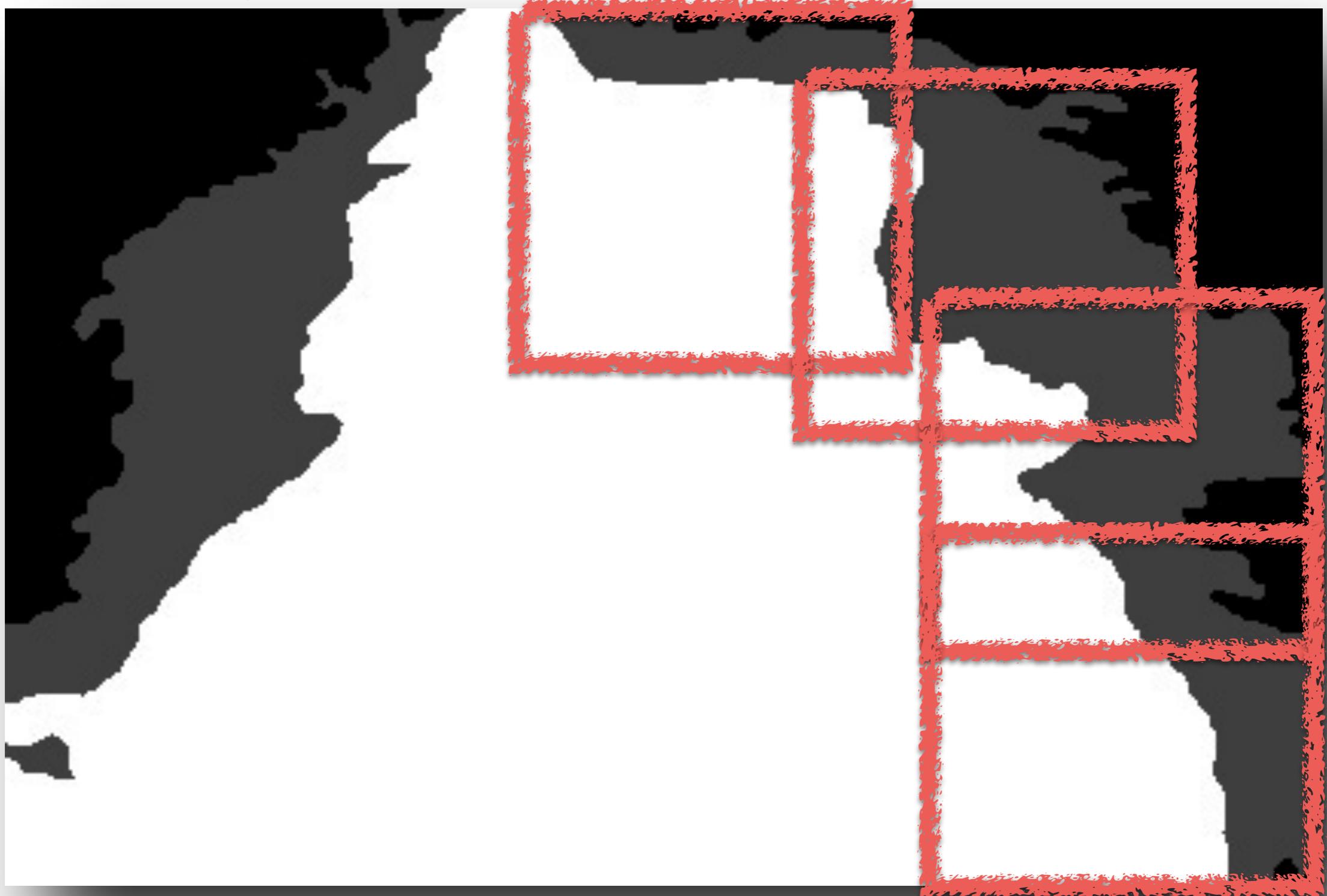


步驟四，跳回步驟一

Iterator **k** 次



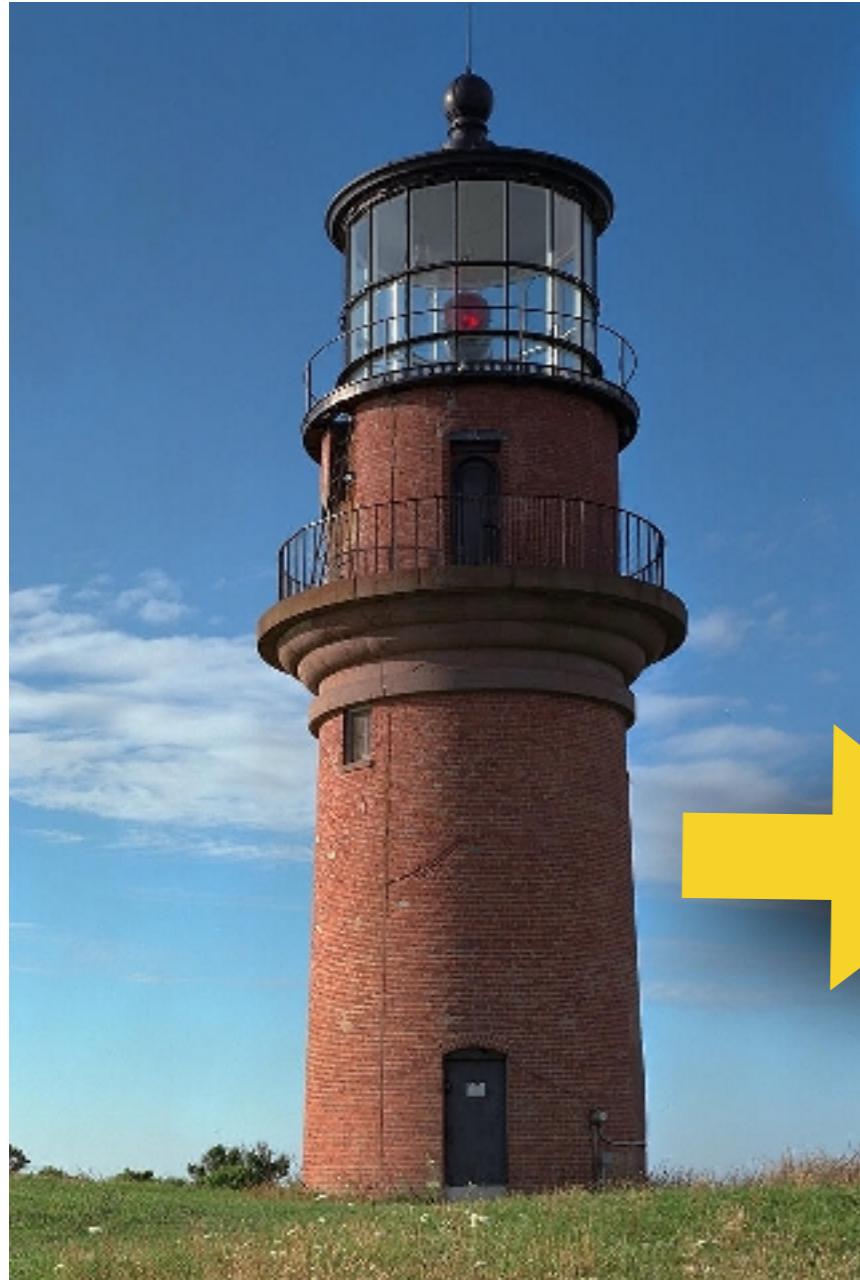
把其他的區域也都做完....



把做好的foreground
丟到喜歡的背景



建築物～



Loli~ Trimap



Loli~ 完成品～



Loli 改二 Trimap



Loli 改二 ~ 完成品



Demo

Q & A