=In the period 1962-1977, 205 patients with malignant melanoma had a radical operation performed at the Department of Plastic Surgery, University Hospital of Odense, Denmark. Refer to Appendix of Andersen, Borgan, Gill and Keiding (1993) (pp. 709 – 714) for more details of the dataset. The event recorded is a relapse or death related to the cancer after receiving a radical operation. All covariates used in this analysis were collected at the study entry.

ID: ID

tilde.T: 追蹤時間

Indicator: 1: dead from malignant melanoma

2: alive 1 January 1978

3: dead from other cause

Sex: 1: Male；0: Female

Age: 手術年齡

Year.of.operation: 手術的年份

Tumor.Thickness: 腫瘤厚度 (mm)

Ulceration: 1: 腫瘤有潰瘍；0: 腫瘤無潰瘍

delta: 1: 因malignant melanoma而死；0: 其他

Reference:

Andersen PK, Borgan O, Gill RD, Keiding N. *Statistical models based on counting processes*. Springer Verlag: New York, 1993.

Here, we are interested in the time to death from malignant melanoma. Thus, the death from other cause is the conditionally independent censoring. **Please set the censoring indicator “delta” by yourself.**

[1] Please set categorize the Tumor.Thickness into thre groups by using two dummy variables of skin.1 and skin.2,

Tumor.Thickness<=2，(skin.1, skin.2)=(0, 0)

2<Tumor.Thickness<=5，(skin.1, skin.2)=(1, 0)

5<Tumor.Thickness，(skin.1, skin.2)=(0, 1)

[2] Please complete the following descriptive statistics：

|  |  |  |  |
| --- | --- | --- | --- |
|  | 男性 | 女性 | p-value |
| 樣本數 (n) | 79 | 126 | ---- |
| 追蹤時間 (Days)  (mean SD) | 1945.709  1148.382 | 2282.643 1089.818 | 0.03868 |
| 年齡 (yr)  (mean SD) | 53.89873  17.60652 | 51.56349 | 0.3408 |
| 腫瘤厚度 (mm)  Tumor.Thickness<=2, n (%)  2<Tumor.Thickness<=5, n (%)  5<Tumor.Thickness, n (%) | 40.5  35.4  24.0 | 61.1  21.1  10.3 | 0.006265  0.3797  0.01473 |
| 潰瘍 n (%) | 54.4 | 37.3 | 0.02379 |
| 結果 人數 (%)  1 dead from malignant melanoma)  2 alive  3 dead from other causes | 36.7  54.4  0.09 | 22.2  72.2  0.06 | ---- |

[3]

1. Please draw the KM curves stratified by sex and describe what we find.

一張含有 文字, 螢幕擷取畫面, 繪圖, 圖表 的圖片

AI 產生的內容可能不正確。

男性因黑色素瘤的死亡率較女性高。

1. Please test the difference between two survival functions in Question (1) and draw your conclusion.

一張含有 文字, 螢幕擷取畫面, 字型 的圖片

AI 產生的內容可能不正確。

p-value=0.01 < 0.05，兩條曲線不同。

1. Please draw the KM curves stratified by sex and ulceration. Describe what we find.

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AI 產生的內容可能不正確。

女性無潰瘍的曲線最為平緩，其後為男性無潰瘍，再是女性有潰瘍，而男性有潰瘍下降最多，代表性別男且有潰瘍的死亡率最高。

1. Please test the difference between two survival functions in Question (3) and draw your conclusion.

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AI 產生的內容可能不正確。

group的定義

0.0 → Female, No Ulcer

1.0 → Male, No Ulcer

0.1 → Female, Ulcer

1.1 → Male, Ulcer

Log-rank 檢定結果 p = 2×10⁻⁷，顯示性別與潰瘍狀態分組的四條生存曲線存在高度顯著差異。這表示性別與潰瘍狀態均對生存有顯著影響。

1. Analyze the time to death from the melanoma by the Weibull accelerated failure time (AFT) model with sex, age, ulceration, skin.1 and skin.2 we well as the interaction between sex and ulceration.

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AI 產生的內容可能不正確。

1. Please interpret the effect of Tumor.Thickness from the analysis results.

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AI 產生的內容可能不正確。

腫瘤厚度介於2-5mm之間的組別，生存時間縮短到<2mm組別的42%；而大於5mm的組別，統計不顯著，表示此組別與<2mm組別的生存時間沒有太大差別。

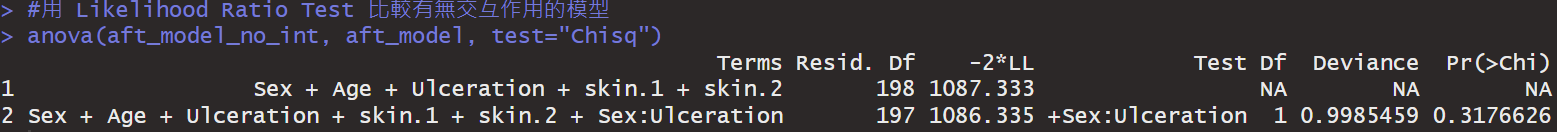
1. Please interpret the effect of ulceration from the analysis results.

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AI 產生的內容可能不正確。

有潰瘍的患者生存時間約為無潰瘍患者的34%，p-value<0.05，潰瘍顯著增加死亡風險。

1. Please test the effect of interaction between sex and ulceration.



p-value>0.05，性別與潰瘍並無顯著交互作用。

1. From the results of (5), should you consider the interaction between sex and ulceration in the model?

不需用考慮兩者的交互作用。

1. From the results of (6), please test the effects of 2 dummy variables of skin.1 and skin.2. What is your conclusion?

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AI 產生的內容可能不正確。

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AI 產生的內容可能不正確。

不考慮性別與潰瘍的交互作用之後，腫瘤厚度2-5mm以及>5mm的組別與<2mm的生存時間都有顯著差異(p-value<0.05)，且生存時間縮短到<2mm組別的43%。

1. Using the conclusion of Question (6), please calculate the 5-year survival rate and cumulative hazard for male, age 60 with ulceration and tumor thickness 3.5 mm. [限公衛所統資組必寫]

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AI 產生的內容可能不正確。

對於一位 60 歲男性、有潰瘍、腫瘤厚度 3.5 mm 的患者，Weibull AFT 模型預測其 5 年存活率約 49%，累積死亡風險約 71%。

程式碼網址:

<https://github.com/Lai-jun-yan/Survival_data_analysis/tree/master/%E4%BD%9C%E6%A5%AD2>