



MATLAB程式語言

3D列印機操作說明與列印示範

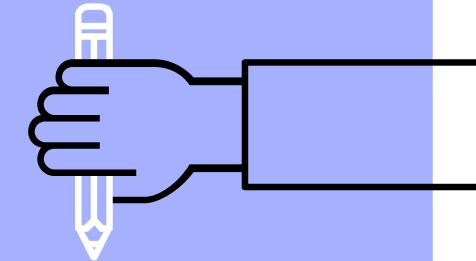
盧家鋒 副教授
生物醫學影像暨放射科學系
alvin4016@ym.edu.tw

課程內容

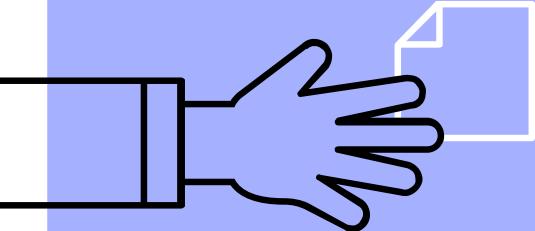
- ▶ 期末專題注意事項
- ▶ 3D列印機操作說明與注意事項

請自行至教學網頁下載本週課程資料

http://www.ym.edu.tw/~cflu/CFLu_course_matlabimage.html



期末專題注意事項





3D列印模型設置



吳孝觀 博士
NYMU Maker Space



Ultimaker Cura

檔案 (E) 編輯 (E) 檢視 (V) 設定 (S) 擴充功能 (X) 工具箱 (I) 偏好設定 (R) 幫助 (H)

CURÆ. 準備 監控 實體檢視 Creality CR-8

耗材 PLA 檢查相容性

列印設定 推薦 自訂選項

層高 0.06 0.1 0.15 0.2 0.3 0.4 0.6
更慢 更快

列印速度 10%
 啟用漸層

填充 產生支撐

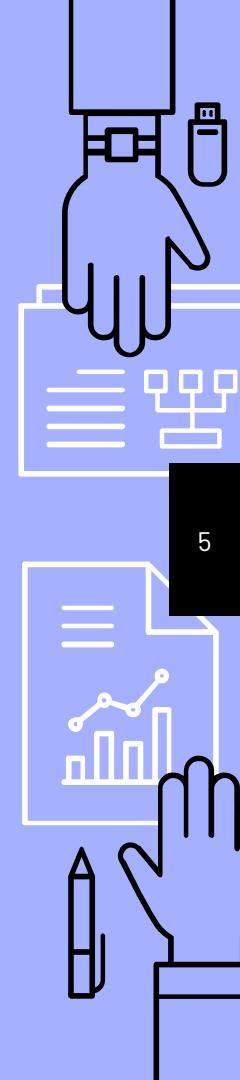
列印平台附著

需要幫助改善你的列印？閱讀 Ultimaker 故障排除指南

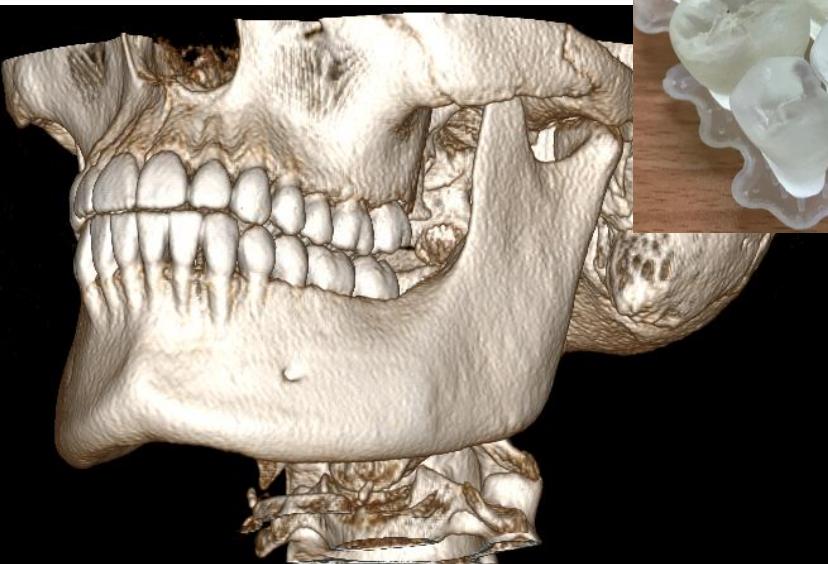
切片已準備就緒
CCR10_DentalCT_binary
132.2 x 137.4 x 100.9 mm
00時 00分 0.00m / ~0g 準備

影像處理與3D列印專題分組

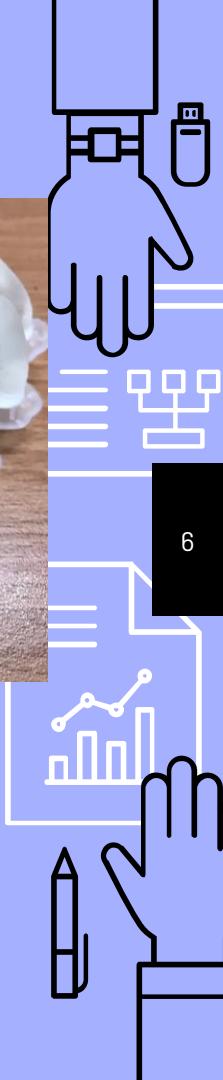
- ▶ 84位修課學生，共分為18組（12組5人、6組4人）
- ▶ Dental CT
- ▶ Skull CT
- ▶ Spine CT
- ▶ Spine+rib CT
- ▶ Pelvis CT
- ▶ Upper limb CT
- ▶ Lower limb CT
- ▶ Heart CT
- ▶ Brain MRI
- ▶ Total body CT
- ▶ Rat skull microCT



Dental CT

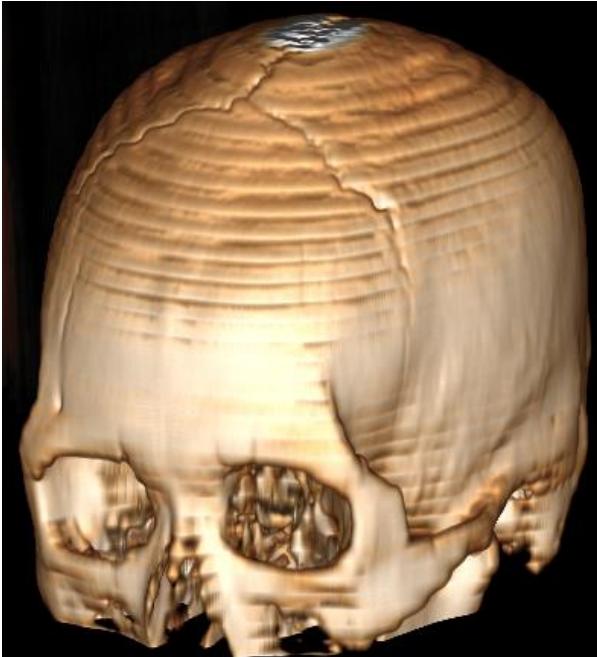
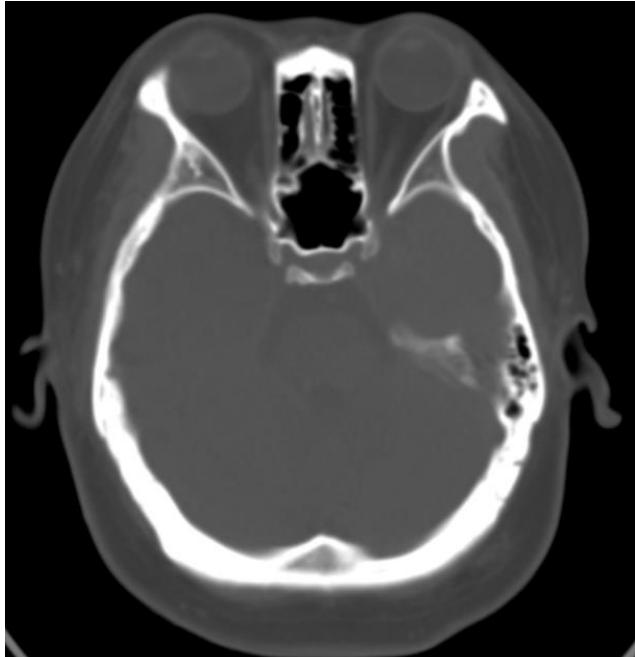


+ roipoly & proper thresholding



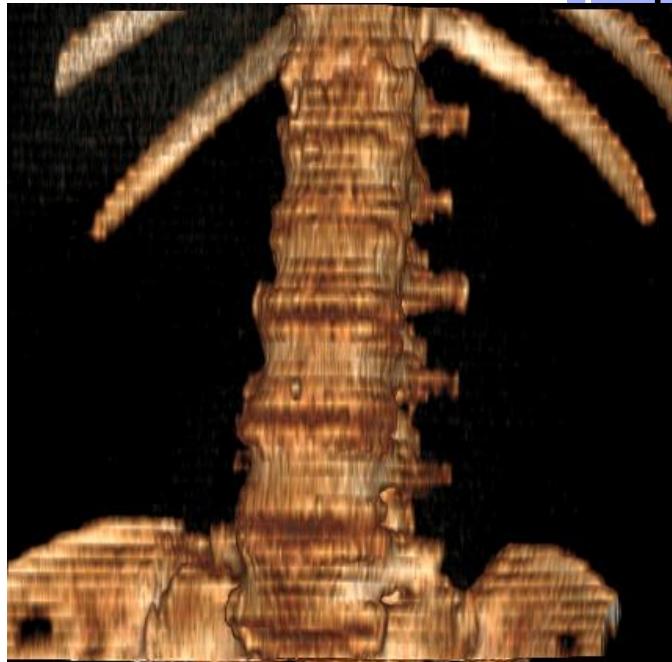
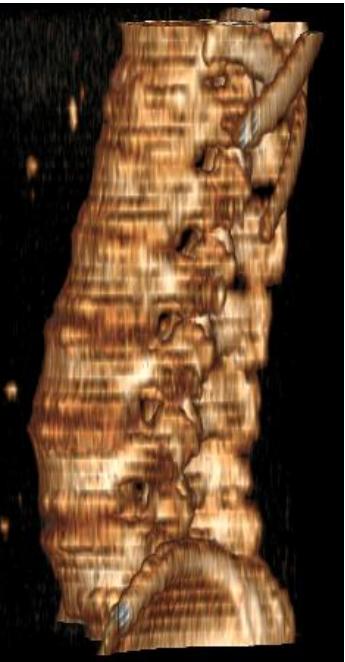
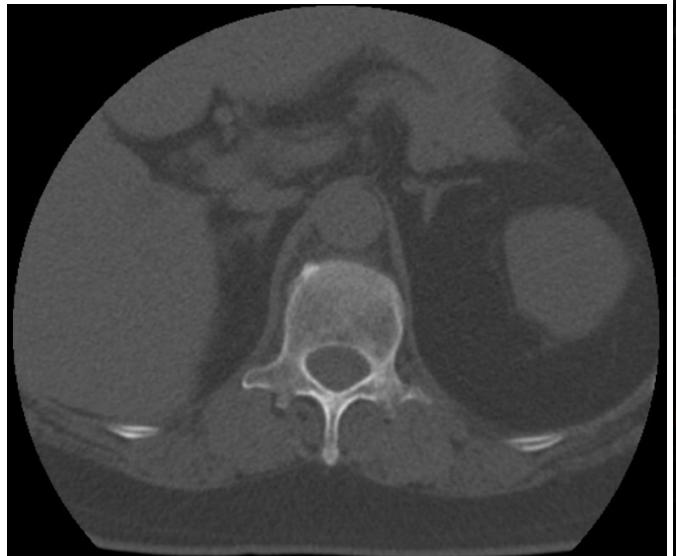
Skull CT

+ Image interpolation and smoothing



L-Spine CT

+ Image interpolation and smoothing



L-Spine CT

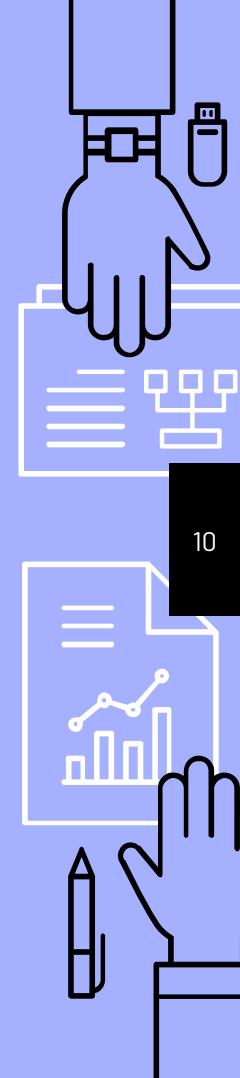
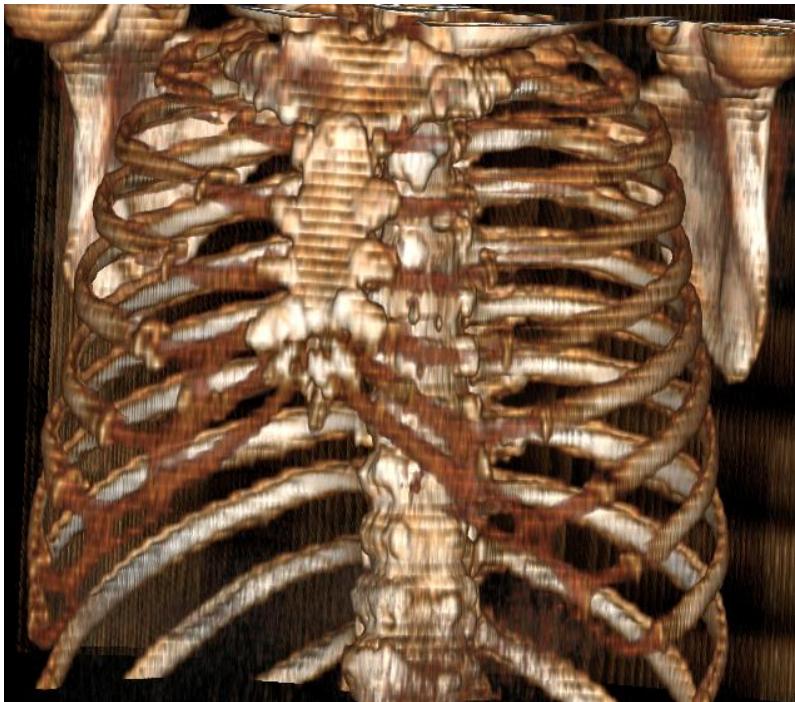


Photos shared by Team #2



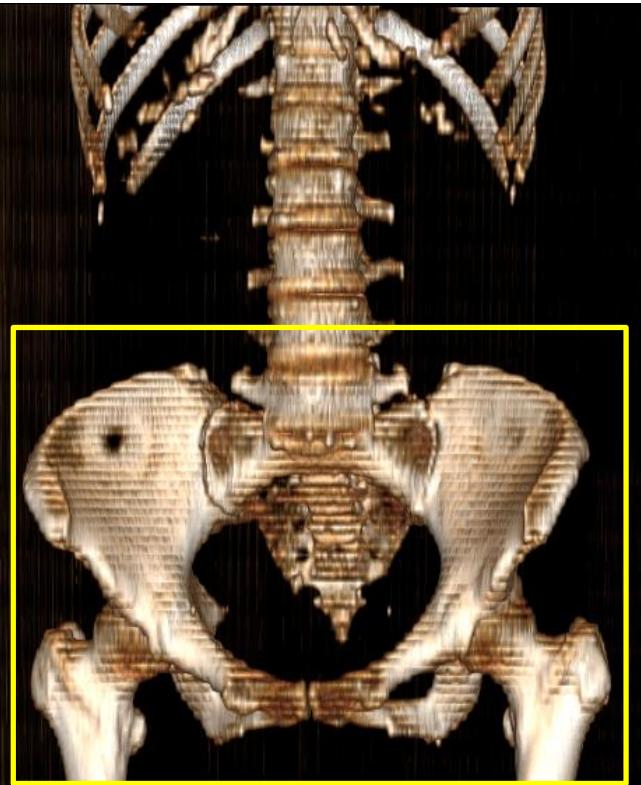
T-Spine + Ribs CT

+ roipoly & proper thresholding



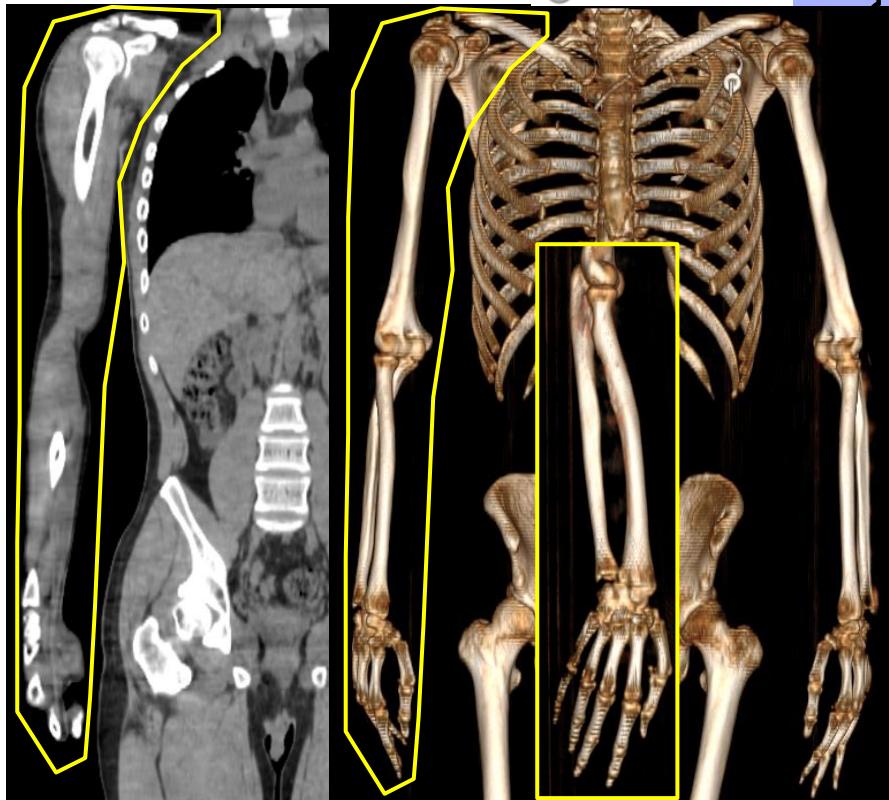
Pelvis CT

+ slice selection & proper thresholding



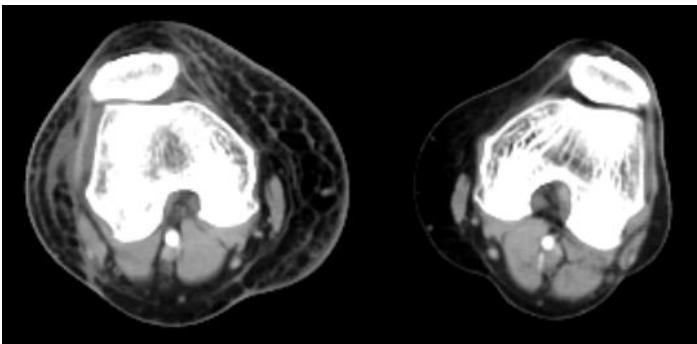
Upper limb CT

+ roipoly & proper thresholding



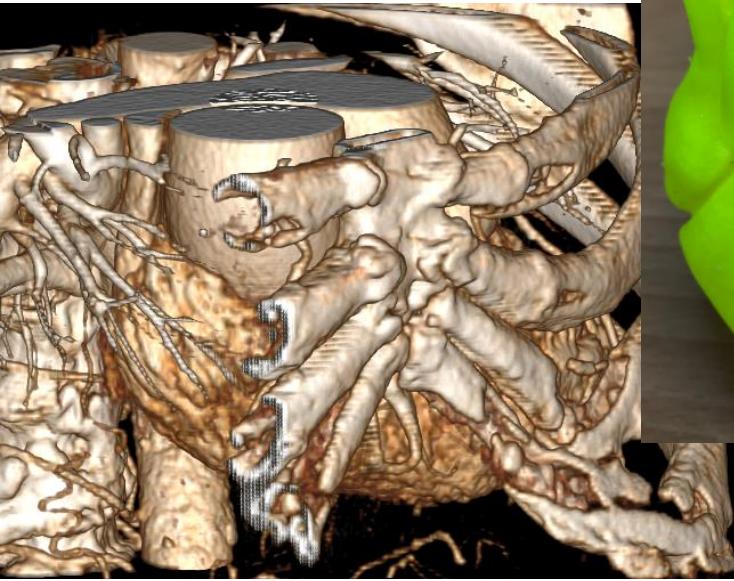
Lower limb CT

+ (roipoly) & proper thresholding



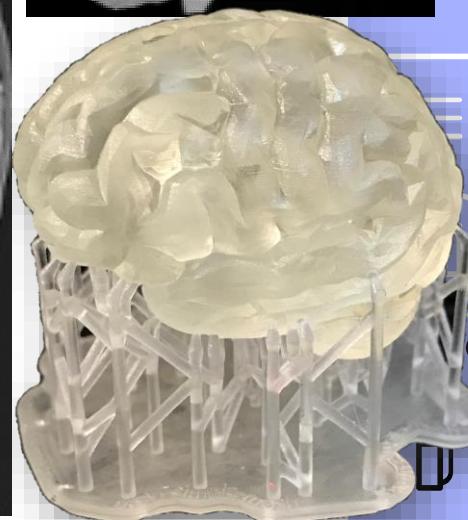
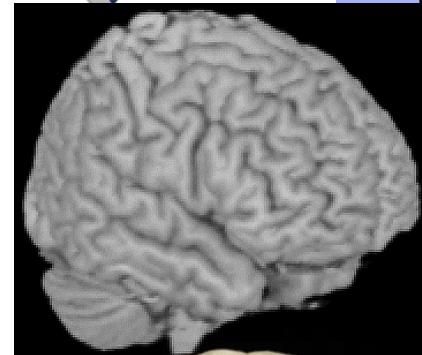
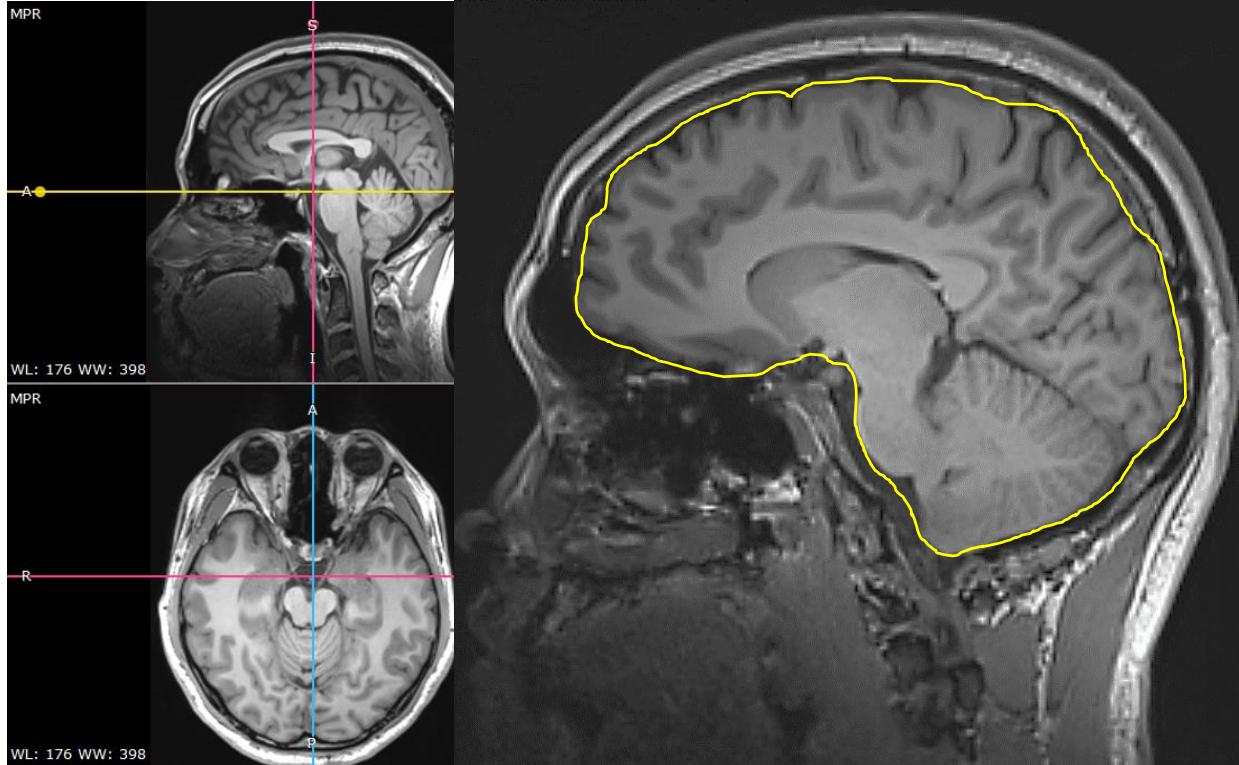
Heart CT

+ roipoly & proper thresholding (lower value)



Brain MRI

+ roipoly & proper thresholding



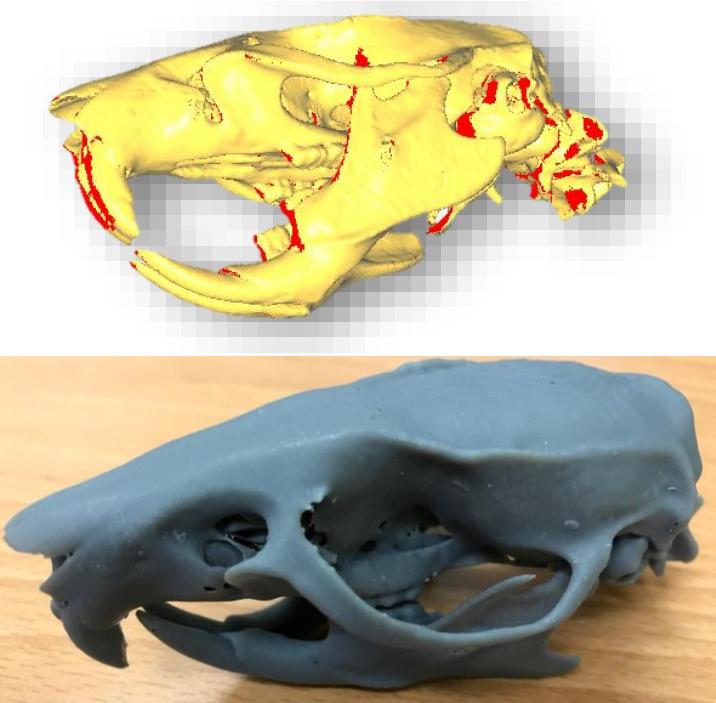
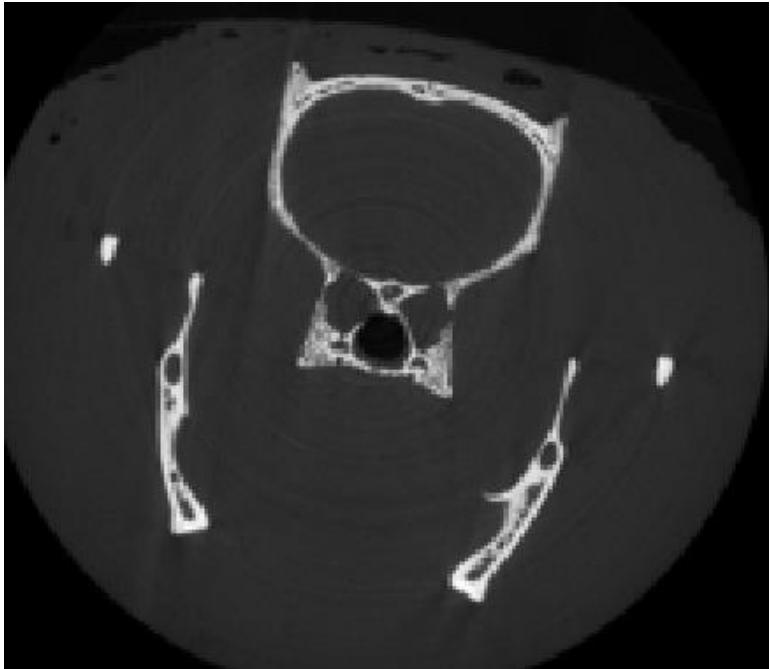
Total body CT

+ proper thresholding



Rat skull microCT

+ proper thresholding

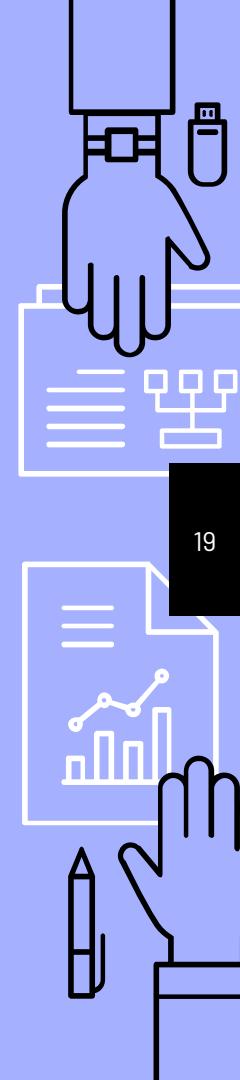


小組分工討論

- ▶ 程式碼撰寫
(影像內插、圈選、模型輸出)
- ▶ Cura 3D列印檔案修改與最佳化
- ▶ 進行3D列印(請全組在創客中心合照)
- ▶ 期末小組報告影片錄製(10-15分鐘)
 - Maker space製作過程照片、程式碼分段說明、成品展示照片、小組分工、遭遇問題與討論
- （口頭報告PPT - 請多附照片、程式碼、STL檔案）

期末報告繳交

- ▶ 期末小組報告影片錄製(10-15分鐘)
 - Maker space製作過程照片、程式碼分段說明、成品展示照片、小組分工、遭遇問題與討論
- ▶ 請於1/13前繳交期末報告，應包含四樣檔案：
 - 影片
 - PPT簡報檔
 - 程式碼
 - STL檔



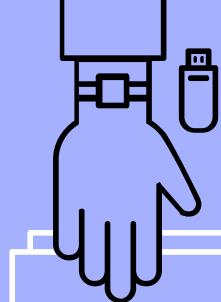
陳姿樺

負責初始程式架構、

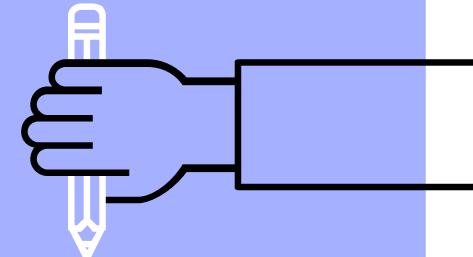
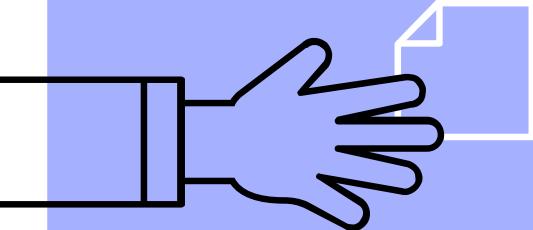
參數選擇

先
↓
後

Isotropicvol 'mean'	Isotropicvol 'mean'	Isotropicvol 'mean'	Isotropicvol 'min'	Isotropicvol 'min'
Smooth3 [3 3 3]	Smooth3	Smooth3	Smooth3	Smooth3
isosurface 1100				
meshsmooth				
reducepatch 0.1				



3D列印機操作說明與 注意事項





工具好朋友

- ▶ 斜口鉗 (進料時
將線捲前端剪
出45度角)
- ▶ 刮刀 (列印完成
後，將成品脫
離熱台)



STEP1: CR-8進料

講師吳孝觀 https://youtu.be/-zofQuPi_Vc



STEP1: CR-2020進料

講師吳孝觀 <https://youtu.be/-W8R9NN9-vw>



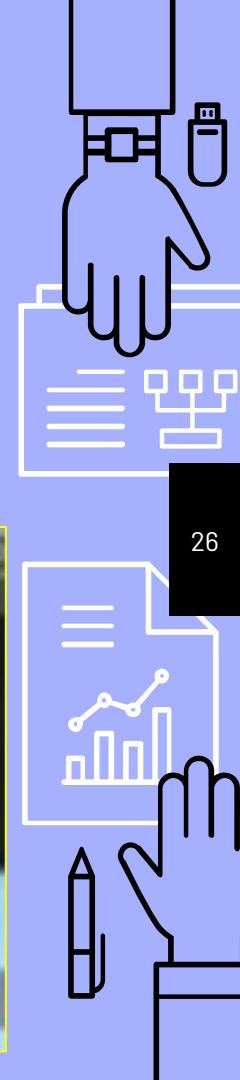
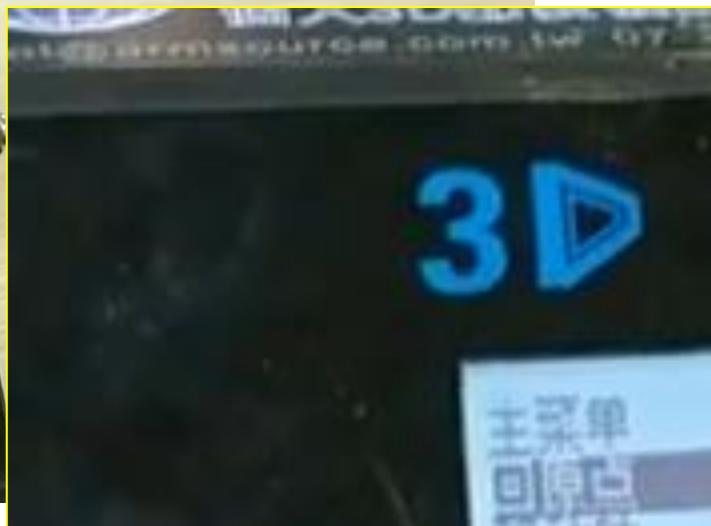
STEP2: CR-8操作介面

講師吳孝觀 <https://youtu.be/B6EPTTEzJe4>



STEP2: CR-8操作介面

講師吳孝觀 <https://youtu.be/B6EPTTEzJe4>



STEP3: 熱床(平台)調平

講師吳孝觀 https://youtu.be/_31p6x8_rMu

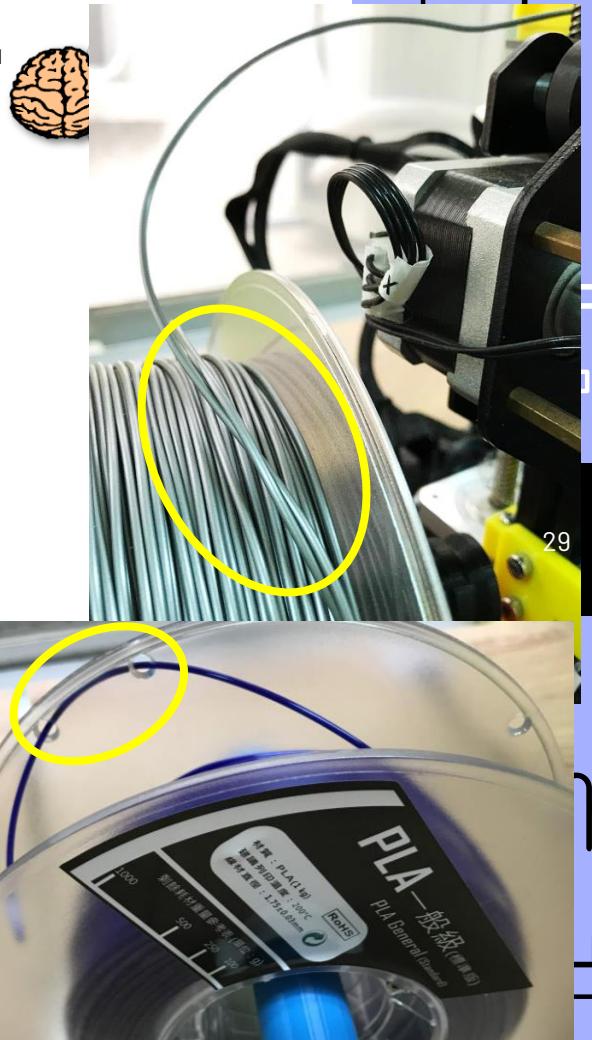


STEP4: 退料步驟

<http://www.ym.edu.tw/~cflu>, Chia-Feng Lu

講師吳孝觀 <https://youtu.be/uGWs53RhFaA>



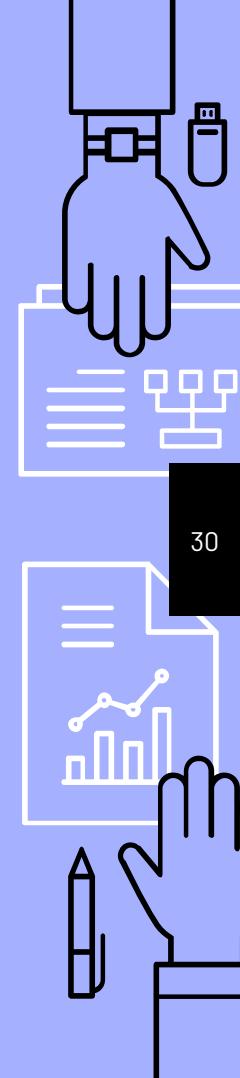


提醒注意事項

- ▶ 安全第一 !!
 - 禁止使用小刀進行模型成品脫離熱台
 - 禁止碰觸噴嘴，碰觸熱台前請務必先確認溫度
- ▶ 線捲使用前，請凹折看看是否會斷裂(會表示變質)
- ▶ 請確認線捲沒有打結，否則進料過程會卡住
- ▶ 線捲於列印完成後請退料、將線頭卡入線捲側邊卡住避免打結，並放回防潮箱內

提醒注意事項

- ▶ 開始列印後，建議觀察列印情況10分鐘，確認順利後再離開



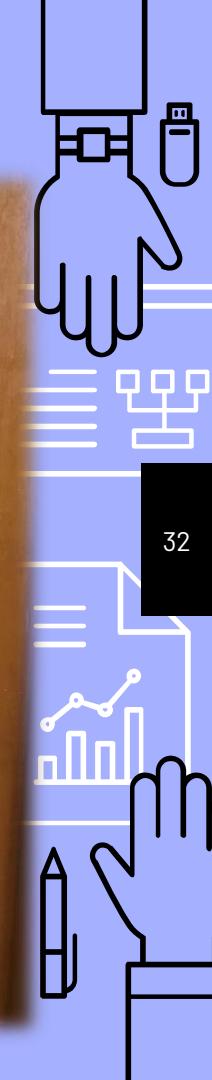
列印所需時間

- ▶ 本學期3D列印專題，建議列印時間為15 hr以內
- ▶ 請預留0.5~1hr為緩衝時間



NYCU Maker Space

- ▶ 生醫工程館五樓後排 549A



NYCU Maker space

- ▶ **生醫工程館549室**，
有空機即可直接使
用
 - CR-8 (上層)
 - CR-2020 (下層)
- ▶ 其他型號機台可以
詢問現場吳博士是
否可用

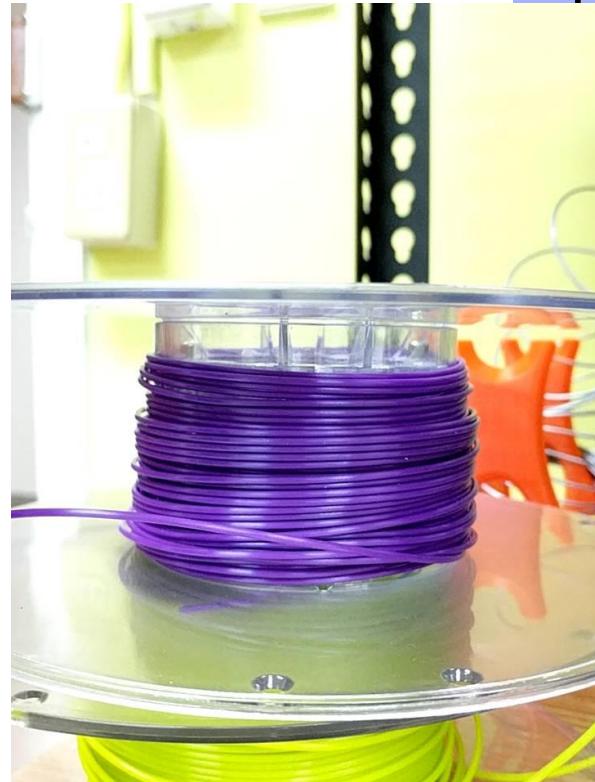


線捲材料放置處

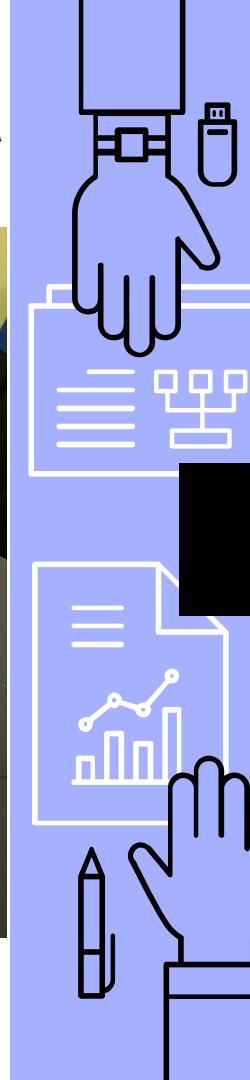
- ▶ 上層為PLA線材



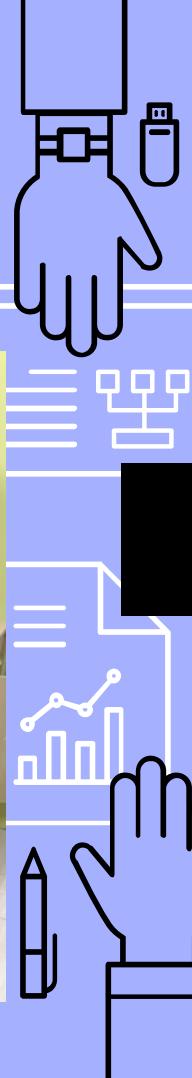
線捲材料注意事項



列印用SD card



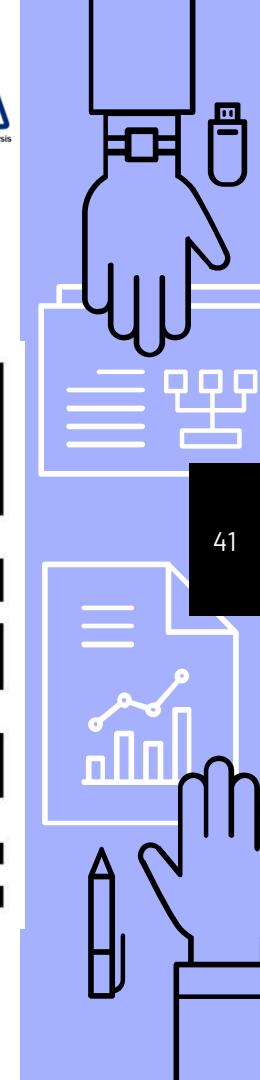
開放討論與使用環境

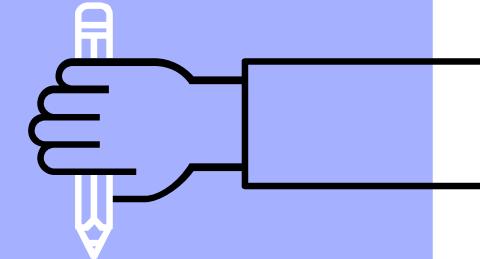
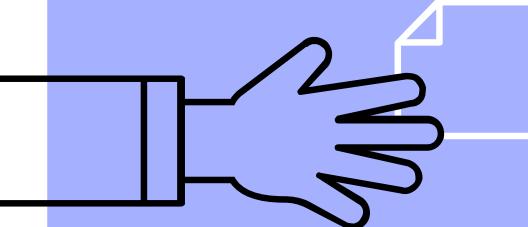




NYCU Maker space

- ▶ LINE群組QR code加入
- ▶ 可即時發問，有任何問題群組上也會有最新消息與列印動態





THE END

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