

Hand bone Segmentation

CV-11

EDA

CV-11

데이터셋

전체 이미지 수: Train 800장, Test 288장

이미지 구성: X-ray 손 이미지

- 손가락, 손등, 팔로 구성
- 총 29개의 class (뼈 종류)가 존재
- 2048x2048, 3 channel
- PNG format

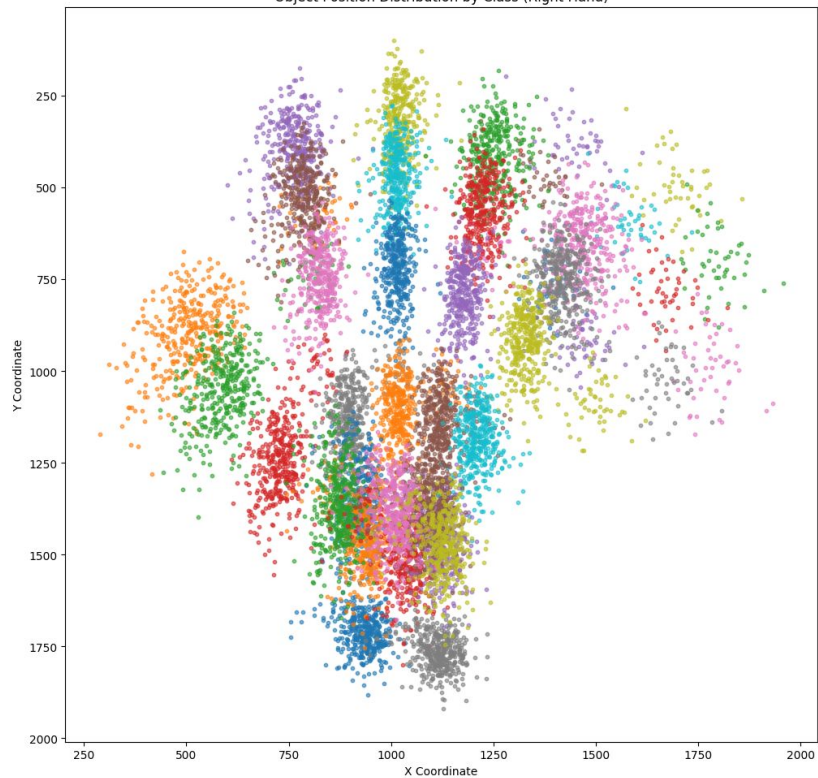
Annotations

annotations:

- id: “
- type: ‘poly seg’
- attribute: {}
- points: masking 되어 있는 고유의 좌표 (예시: [[532,844],[532,832],...[418,747]])
- label: class name

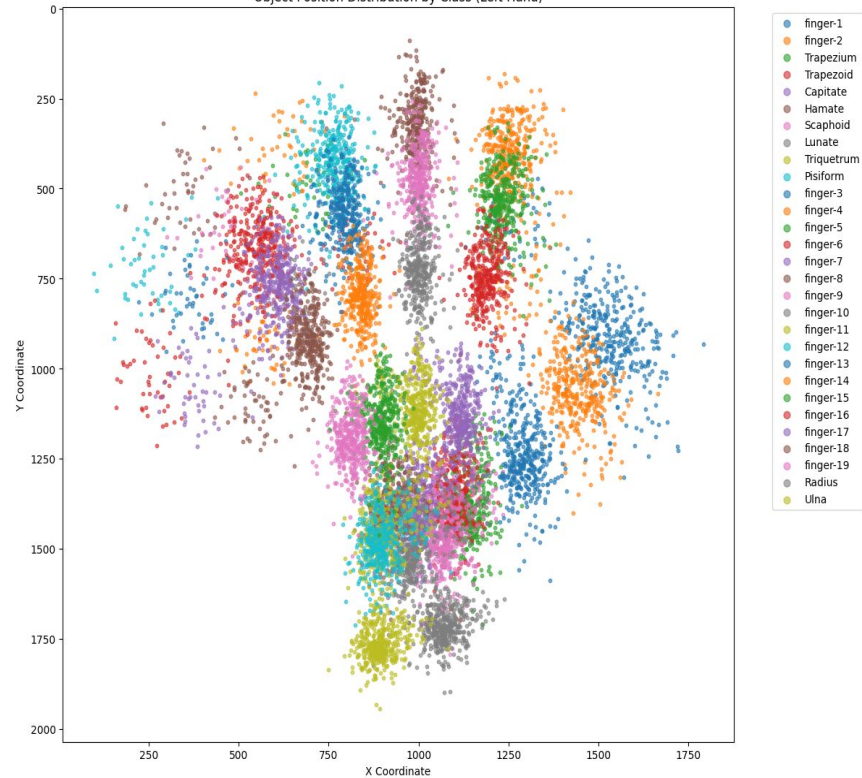
위치 분포

Object Position Distribution by Class (Right Hand)



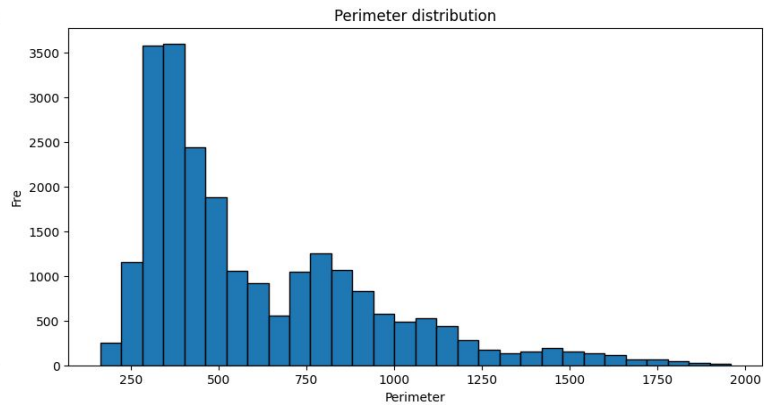
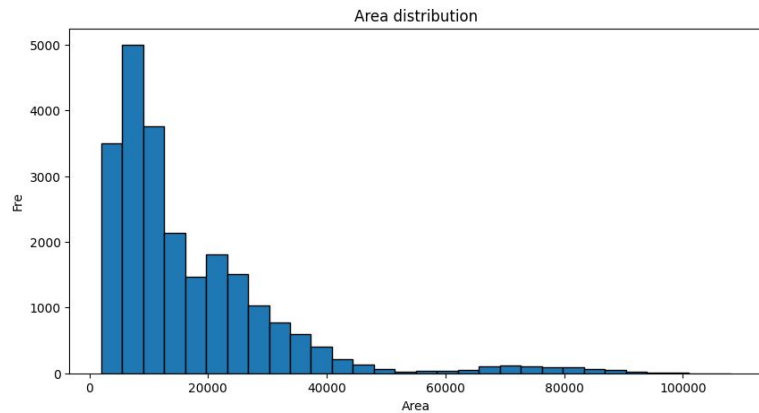
- Radius
- finger-1
- finger-2
- finger-3
- finger-4
- finger-5
- finger-6
- finger-7
- finger-8
- finger-9
- finger-10
- finger-11
- finger-12
- finger-13
- finger-14
- finger-15
- finger-16
- finger-17
- finger-18
- finger-19
- Trapezoid
- Scaphoid
- Trapezium
- Lunate
- Triquetrum
- Hamate
- Capitate
- Ulna
- Pisiform

Object Position Distribution by Class (Left Hand)



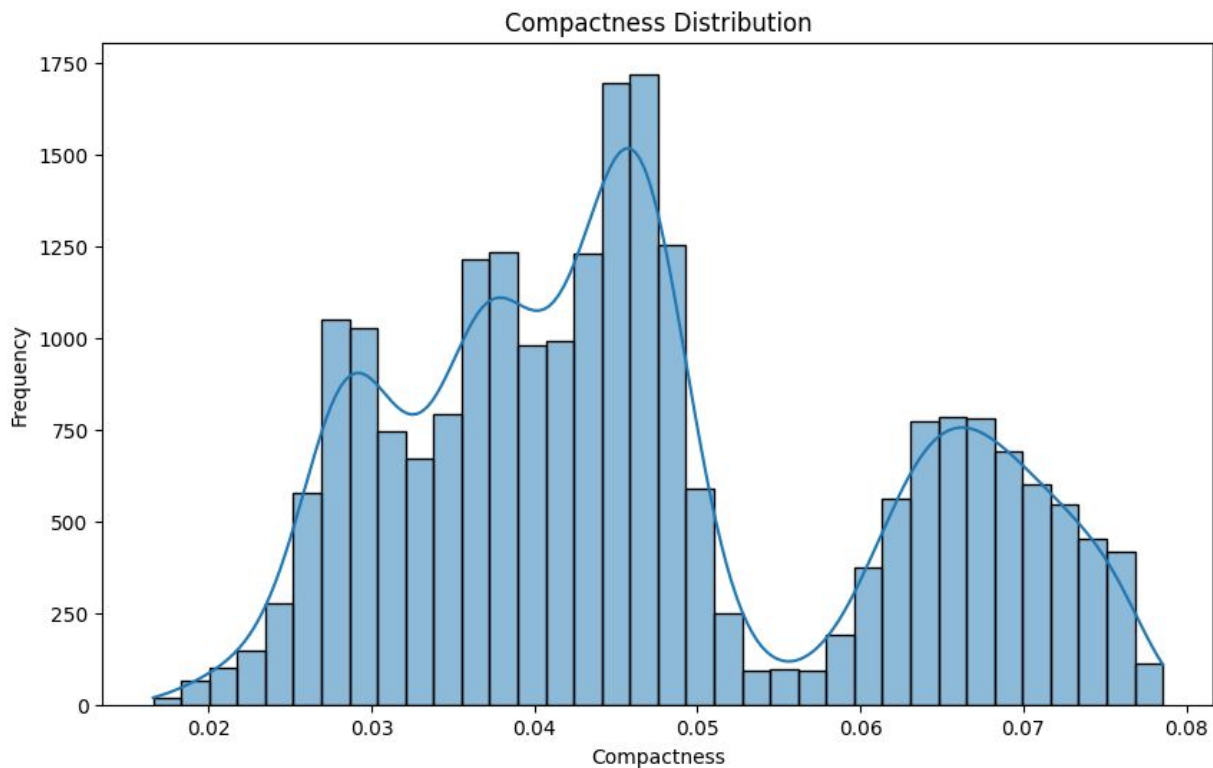
- finger-1
- finger-2
- Trapezoid
- Capitate
- Scaphoid
- Lunate
- Triquetrum
- Pisiform
- finger-3
- finger-4
- finger-5
- finger-6
- finger-7
- finger-8
- finger-9
- finger-10
- finger-11
- finger-12
- finger-13
- finger-14
- finger-15
- finger-16
- finger-17
- finger-18
- finger-19
- Radius
- Ulna

면적, 둘레 분포



대부분은 작은 면적과 둘레를 가지고 있다

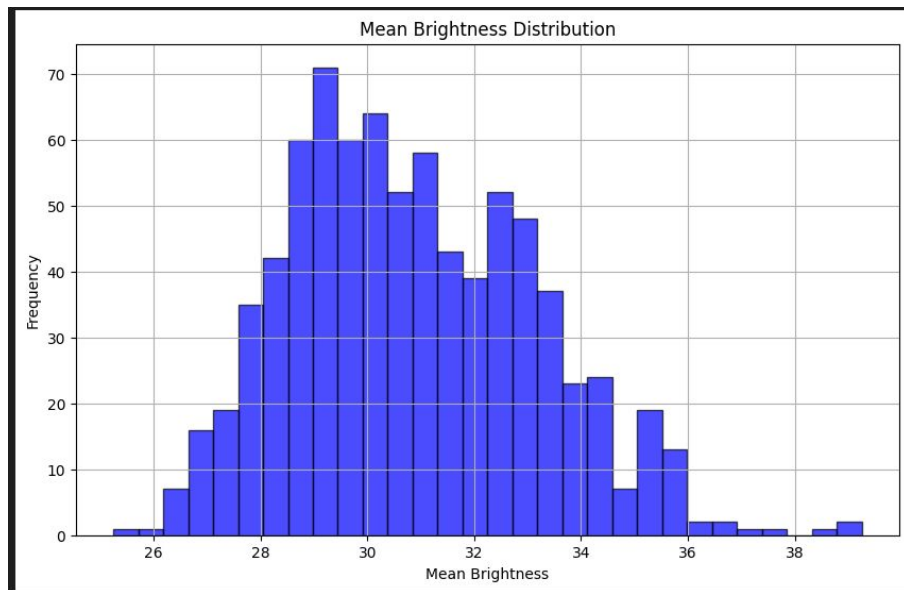
복잡도 분포



27	image1664157383539	Radius
28	image1664157383539	Ulna
35	image1664157399991	finger-7
...
23177	image1666055144561	finger-7
23181	image1666055144561	finger-11
23185	image1666055144561	finger-15
23198	image1666055144561	Radius
23199	image1666055144561	Ulna
[3059 rows x 2 columns]		
높은 Compactness 값을 가진 데이터 샘플:		
	name	labels
19	image1664157383539	Trapezium
20	image1664157383539	Trapezoid
21	image1664157383539	Capitate
22	image1664157383539	Hamate
24	image1664157383539	Lunate
...
23191	image1666055144561	Trapezium
23194	image1666055144561	Pisiform

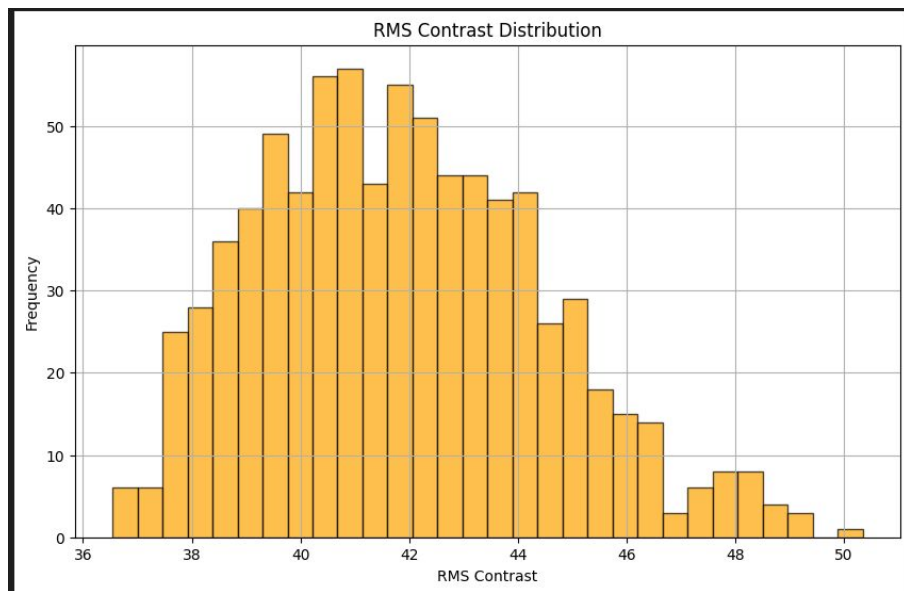
1. 전체 데이터 EDA - 밝기 평균

전반적으로 어두움 (26~ 28에 몰려있음)



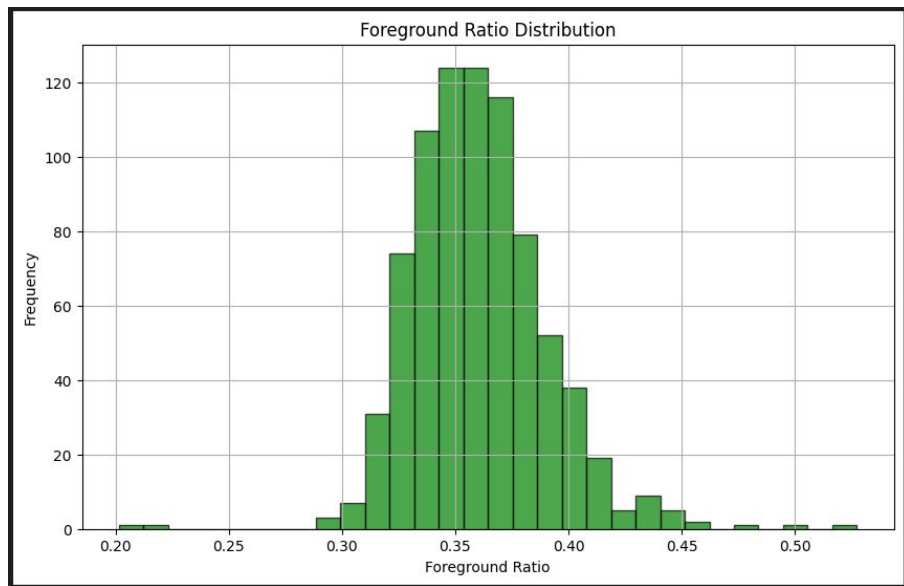
1. 전체 데이터 EDA - 대비 평균

분산값 높을수록 대비가 큼 (밝기 차이가 큼)



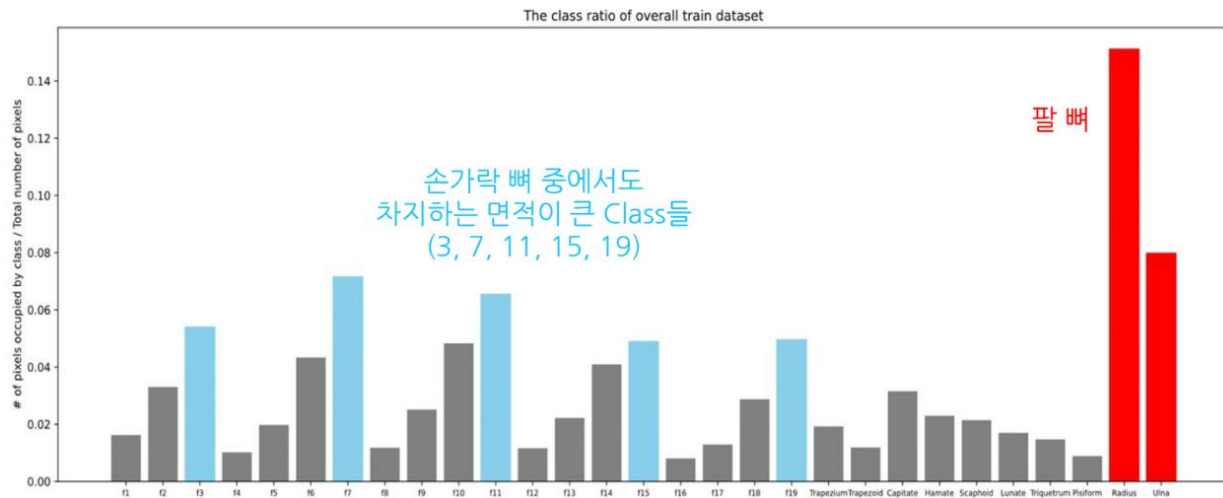
1. 전체 데이터 EDA - 배경 비율

임의의 임계값(20)을 넘는 픽셀/전체 픽셀 값

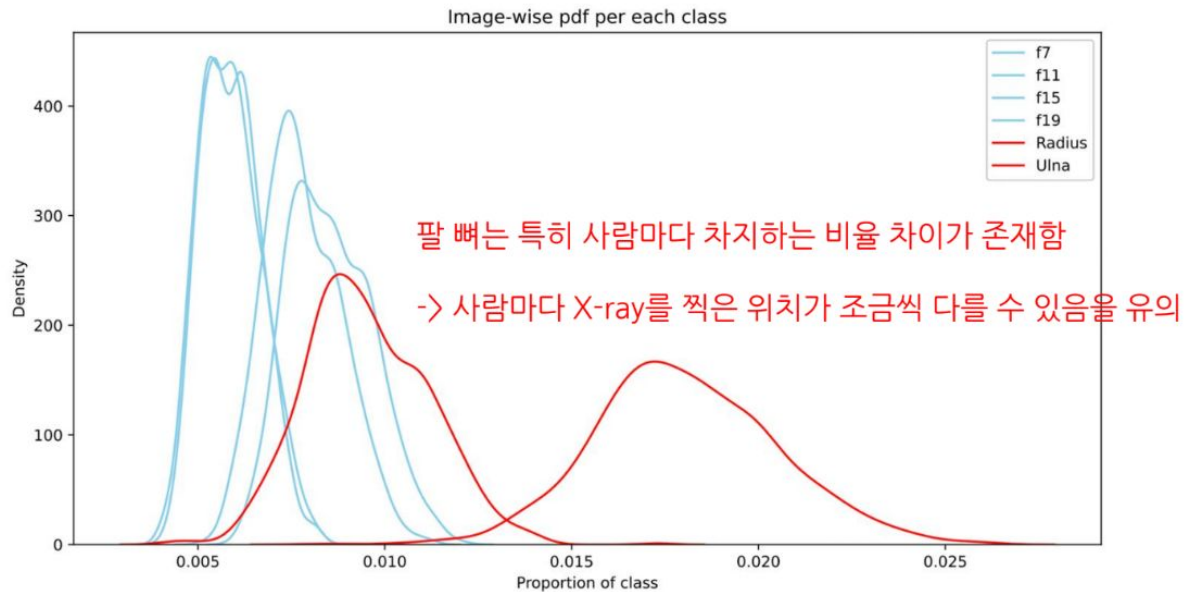


클래스 비율

- 팔 뼈가 제일 큰 영역을 차지
- 손가락 뼈들은 손등에 가까울수록 면적이 큰 경향이 있음

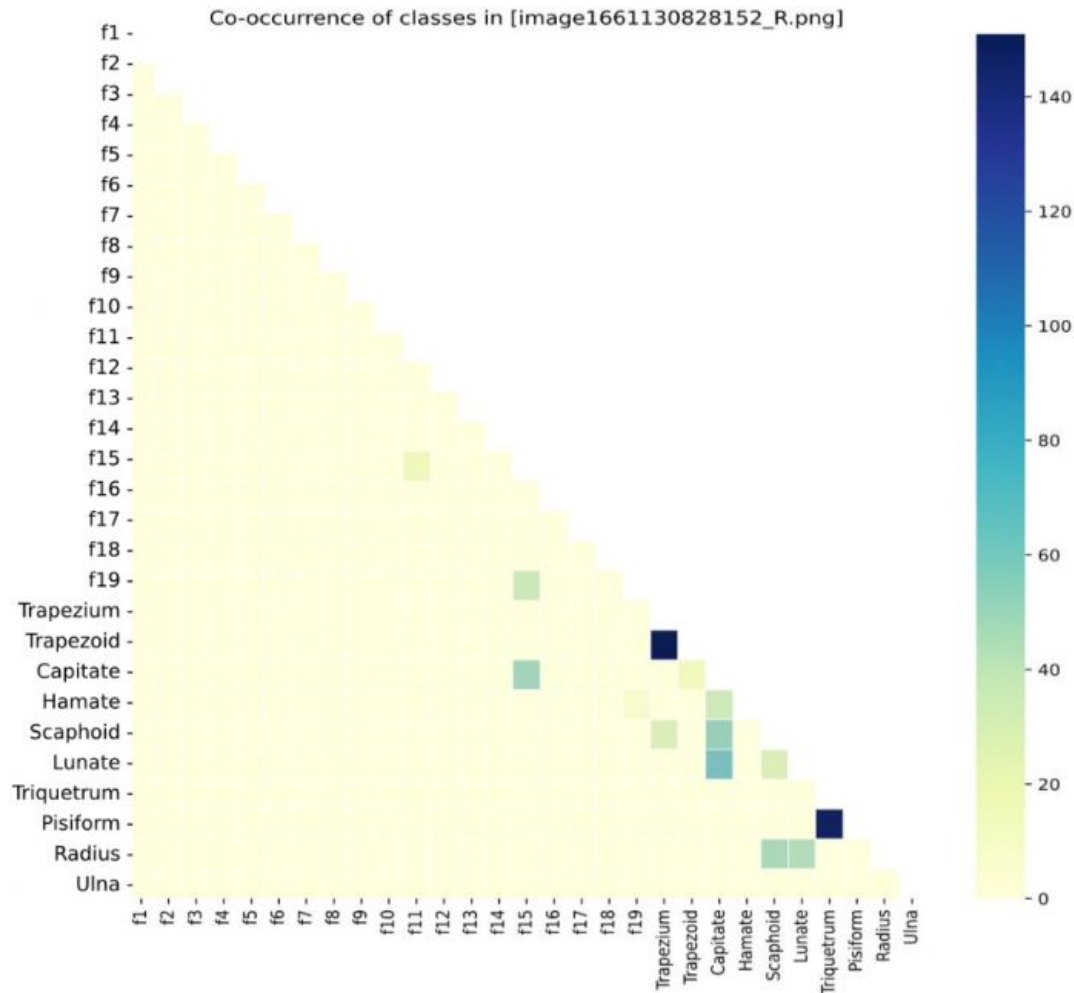


클래스 비율



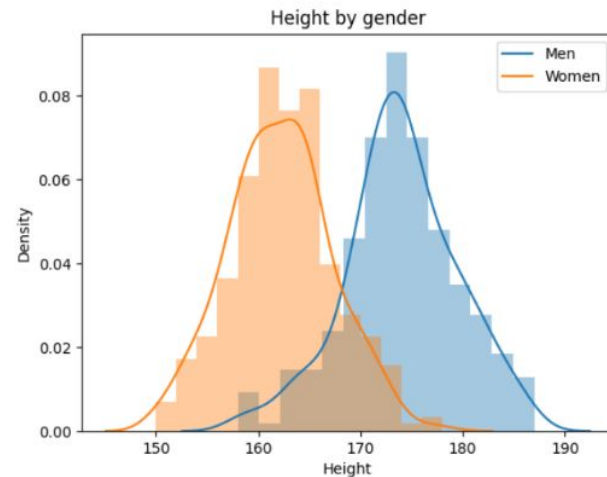
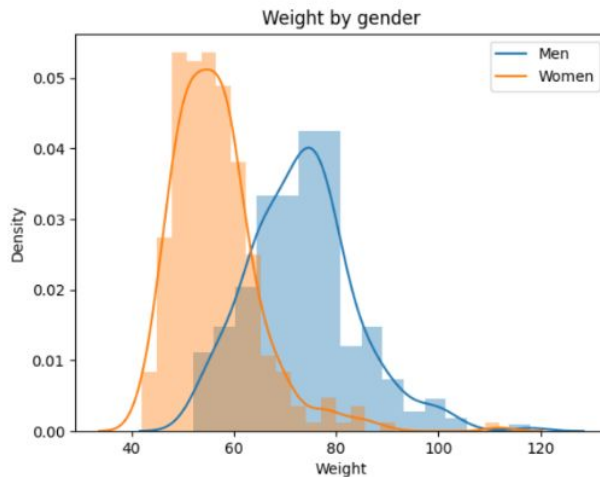
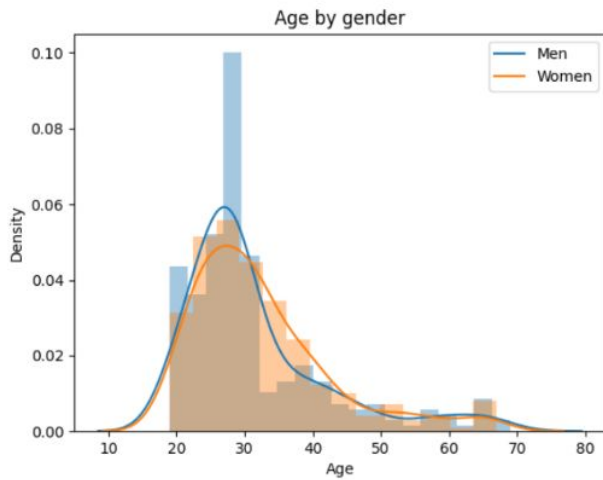
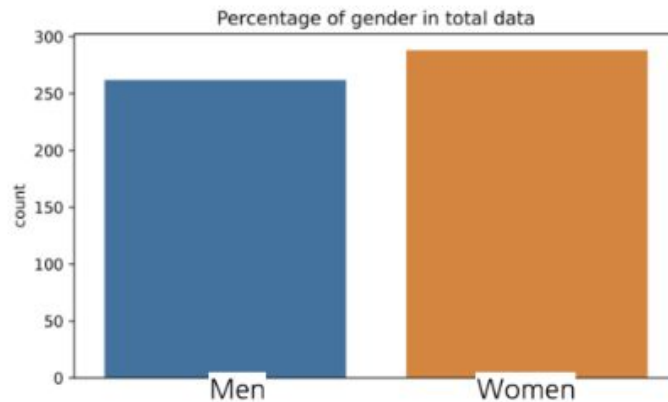
뼈가 겹치면서 같은 부위에 다른
레이블인 상황이 존재

- 주로 손등 뼈 위치
- 대표적인 케이스
 - Trapezium, Trapezoid
 - Triquetrum, Pisiform



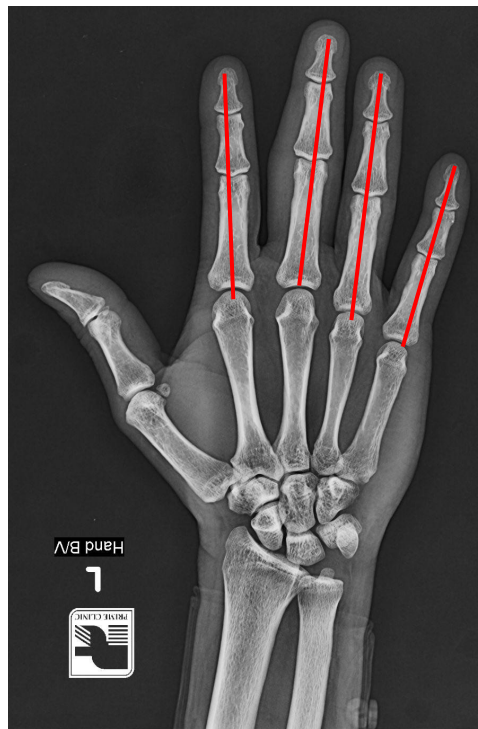
메타 데이터

메타 데이터들이 있음

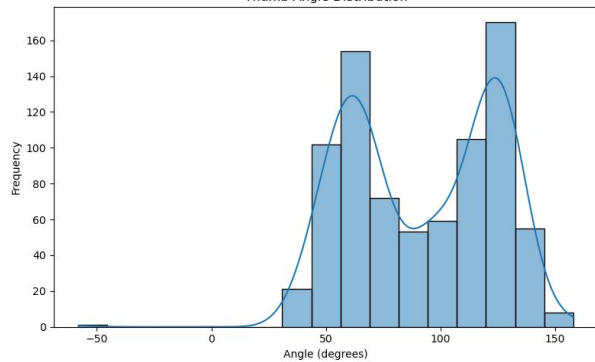


손가락 별 기울기

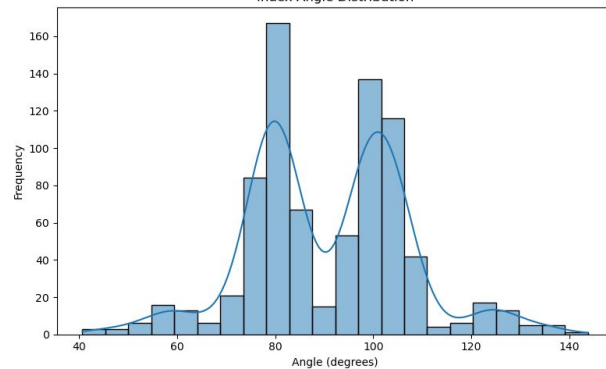
- 계산 방법은 각각 손가락 위의 뼈와 아래 뼈의 첫번째 픽셀을 일직선으로 이어서 기울기를 계산
- 엄지: f1 - f3
- 검지: f4 - f7
- 중지: f8 - f11
- 약지: f12 - f15
- 소지: f16 - f19



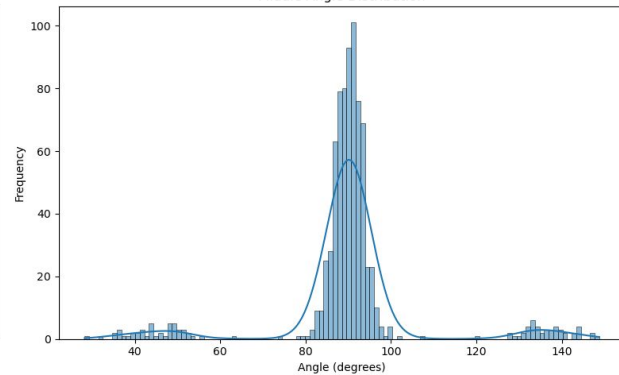
Thumb Angle Distribution



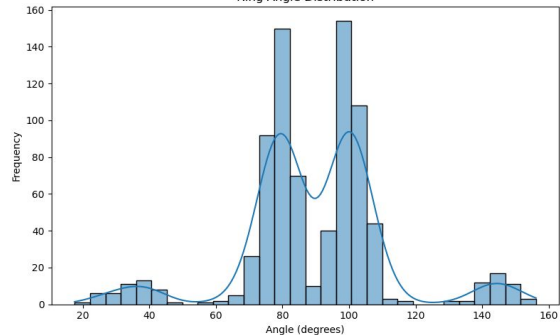
Index Angle Distribution



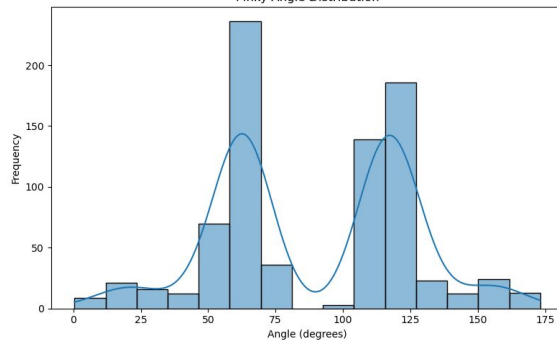
Middle Angle Distribution



Ring Angle Distribution



Pinky Angle Distribution



좌상단부터 엄지

- 90도를 중심으로 대칭 (양손이기 때문에)
- 표준편차는 엄지부터 차례대로 31, 16, 16, 21, 35도씩

	count	mean	std	min	25%	50%	75%	max
<hr/>								
Finger_Pair								
index	800.0	90.730428	16.145441	40.634332	79.258712	91.432420	102.044736	143.811117
middle	800.0	90.175996	16.128308	28.254621	87.590591	90.305038	92.615772	148.772209
pinky	800.0	89.680829	35.668418	0.428639	61.736172	91.325559	118.638810	173.214104
ring	800.0	89.756576	21.772933	17.566897	78.746536	89.401791	100.911359	156.161260
thumb	800.0	92.201124	31.985508	-58.048184	62.135701	94.102030	121.929277	158.019612

기울기가 74도 이하이거나 106도 이상인 중지 데이터

- 49쌍

```
array(['ID274', 'ID275', 'ID276', 'ID277', 'ID278', 'ID279', 'ID280',  
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      'ID295', 'ID296', 'ID297', 'ID298', 'ID299', 'ID300', 'ID301',  
      'ID302', 'ID303', 'ID304', 'ID305', 'ID306', 'ID307', 'ID308',  
      'ID309', 'ID310', 'ID311', 'ID312', 'ID313', 'ID314', 'ID315',  
      'ID316', 'ID317', 'ID318', 'ID319', 'ID321', 'ID436', 'ID529'],  
      dtype=object)
```

이상치

네일아트, 매니큐어, 반지, 보철물 등

이상치 - 마스킹
오류