반려동물

건강관리 서비스:

펫닥터

PetDoctor

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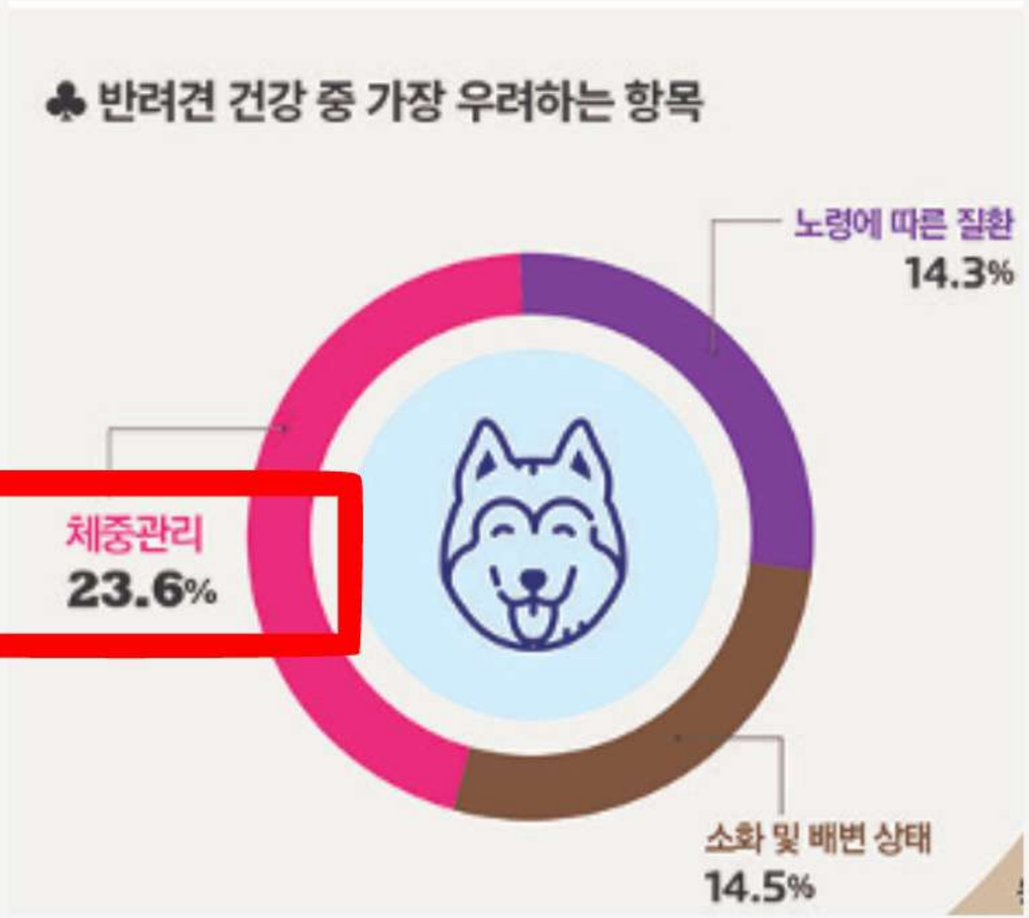


반려견 비만에 대한 우려

반려동물 치료비 지출 증가


그림Ⅳ-2 | 동물병원 선택 기준 (1+2+3순위, 단위:%)

	전체	반려동물 유형별		
		반려견	반려묘	둘 다
가격	53.1	55.1	51.7	42.9
접근성	51.6	51.6	55.7	41.8
의사/직원의 친절함	33.9	36.2	29.1	29.6
원장(의사) 이력/경력	32.0	31.7	32.2	33.7
주변추천/이용후기	31.0	28.7	36.5	33.7
시설, 장비의 우수성	26.0	26.0	21.7	35.7
병원규모/진료과목	23.6	24.3	20.0	27.6
24시간 진료 여부	19.7	17.9	25.2	19.4

주1) 병원 인지도/명성, 병원 프로모션 등 소수의견 제외
주2) 전체 n=1000, 반려견 n=672, 반려묘 n=230, 둘 다 n=98

반려동물 주인들의 경제적 합리성 추구


그림II-18 | 양육 정보 수집 채널 (복수응답,단위:%)

	2018	2021	2023
TV/라디오	18.6	18.7	13.3
신문/잡지	7.4	6.8	6.3
이메일, 문자메시지	5.6	8.2	4.0
인터넷/모바일 포털 검색	46.0	44.4	50.9
카페/블로그/커뮤니티 자료	32.6	35.8	36.9
SNS(트위터, 페이스북 등)	18.4	21.8	19.8
유튜브	21.1	37.4	34.6
가족/친구/지인	31.4	33.9	24.2
펫 전용 웹사이트	15.6	20.1	11.8
펫 전문점에서 직접 확인	14.3	15.7	7.9
동물병원에서 직접 확인	27.7	25.8	21.4
특정 모바일 앱에서 확인	7.9	10.5	7.5
없음	6.0	3.5	6.4

동물 관련 정보 수집에 인터넷 검색 비율 높음

반려견 비만에 대한 우려

동물 관련 정보 수집에 인터넷 검색 비율 높음

반려동물 치료비 지출 증가

반려동물 주인들의 경제적 합리성 추구

사진 촬영 -> AI분석만으로
반려동물 건강관리가 가능하다면
경제적 합리성을 충족시킬 것

반려동물 치료비 지출 증가

반려동물 주인들의 경제적 합리성 추구

반려동물 카테고리 모바일 앱 사용자 연령 비중 분석

(단위:%)

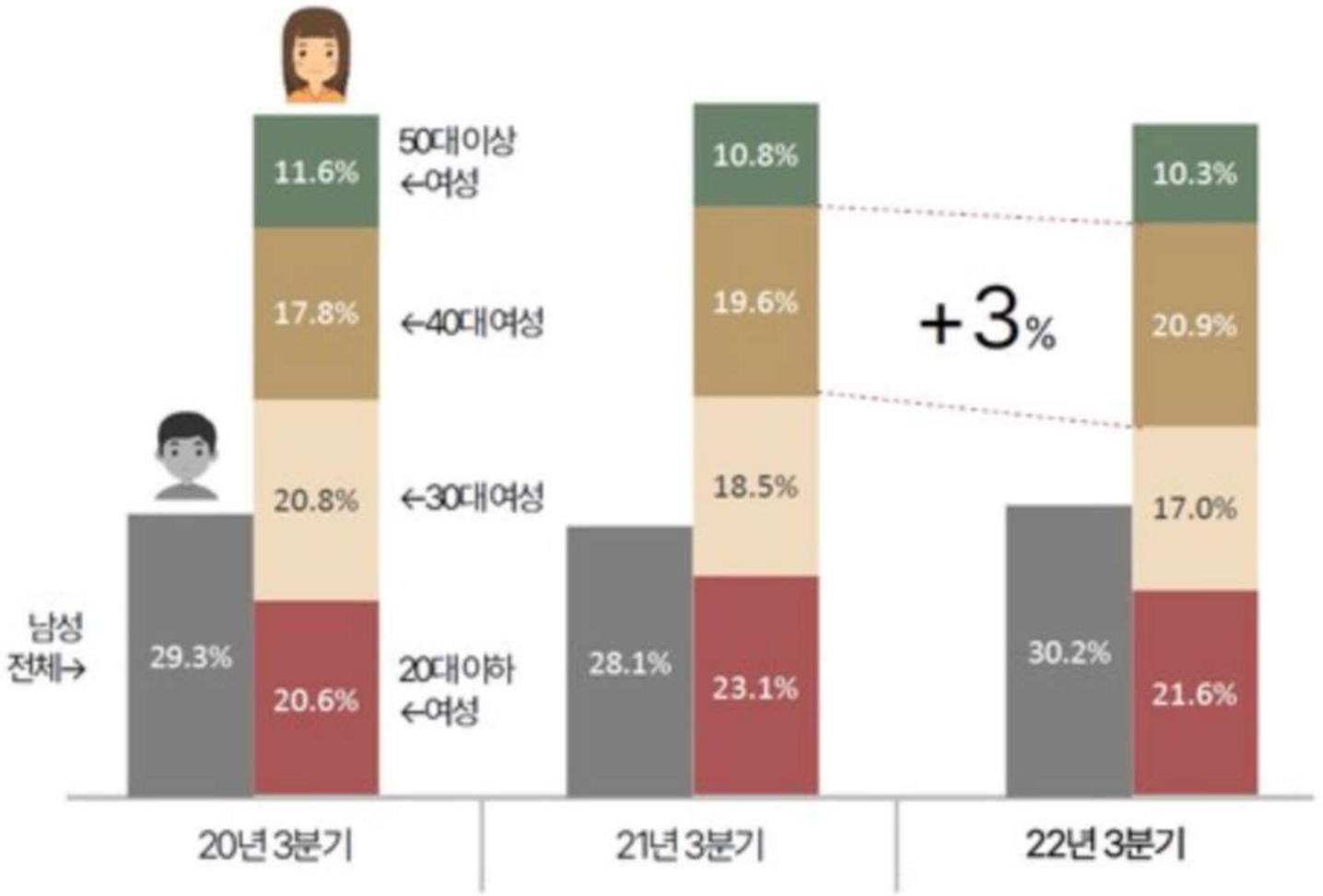


사진 촬영 -> AI분석만으로
반려동물 건강관리가 가능하다면
경제적 합리성을 충족시킬 것

+MZ세대 여성의 니즈를 충족시켜야 한다.

반려동물 주인들의 경제적 합리성 추구

사진 촬영 -> AI분석만으로
반려동물 건강관리가 가능하다면
경제적 합리성을 충족시킬 것

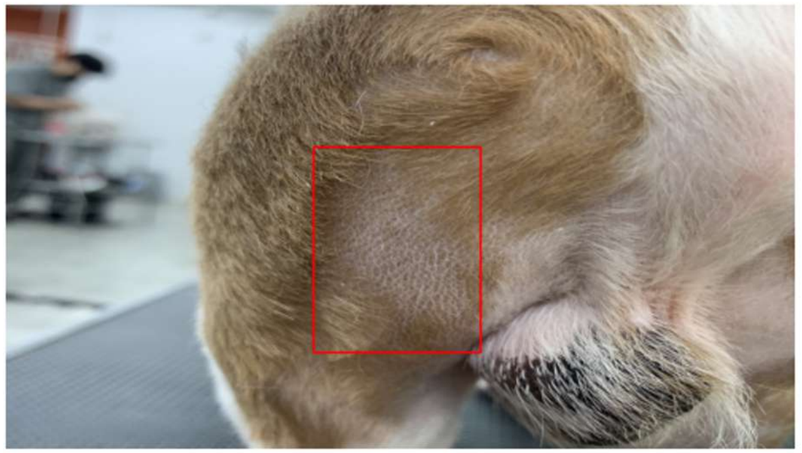
내 반려동물의 기록을
아기자기하고 감성적으로 기록할 수 있어야 할 것

프로젝트 데모

핵심 기능

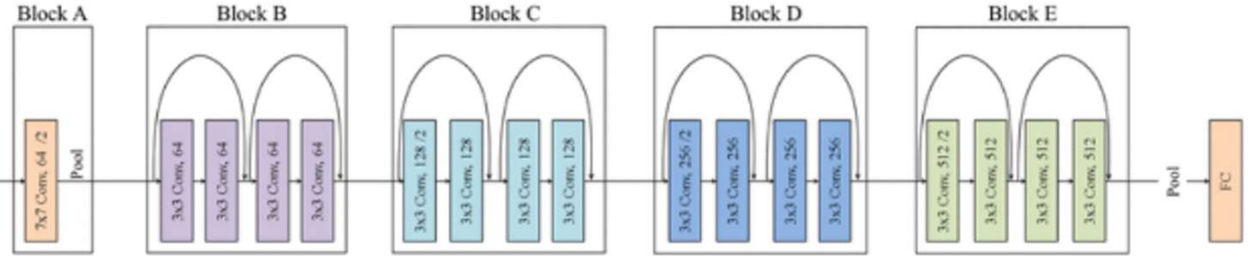
- BCS(비만도) 진단
- 피부 질환 진단
- 기록 확인하기

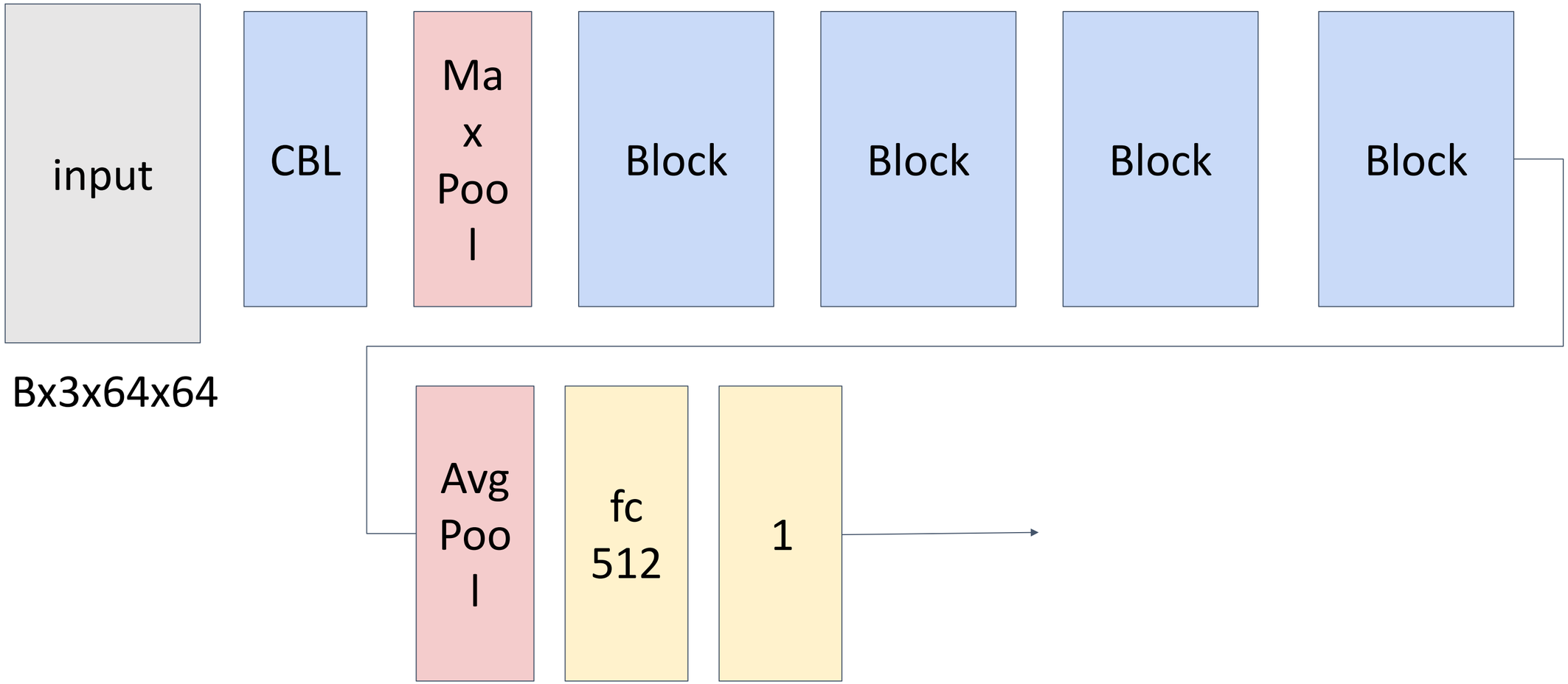
Dataset preparation

구진,플라크	비듬,각질,상피성잔고리	태선화,과다색소침착
		
농포,여드름	미란,궤양	결절,종괴
		

model

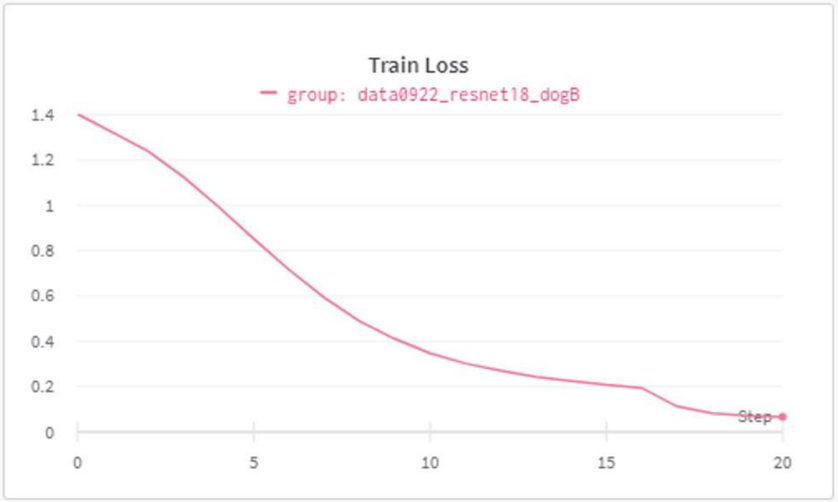
ResNet-18 (Binary Classification)

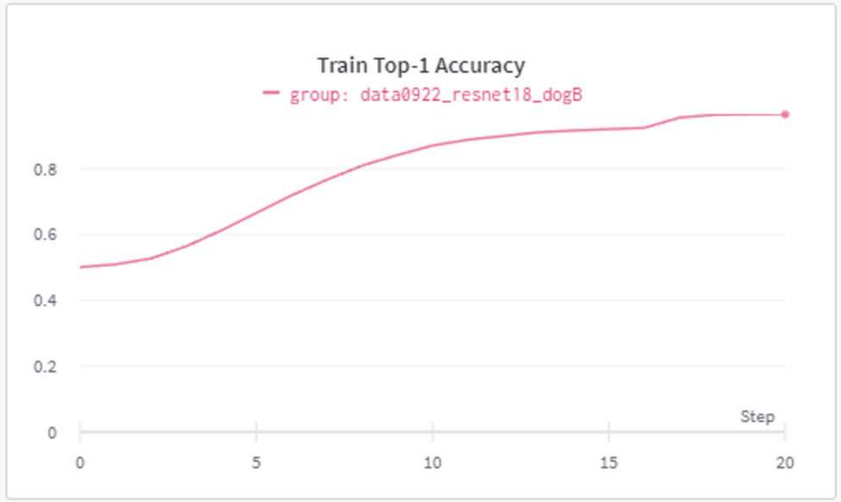


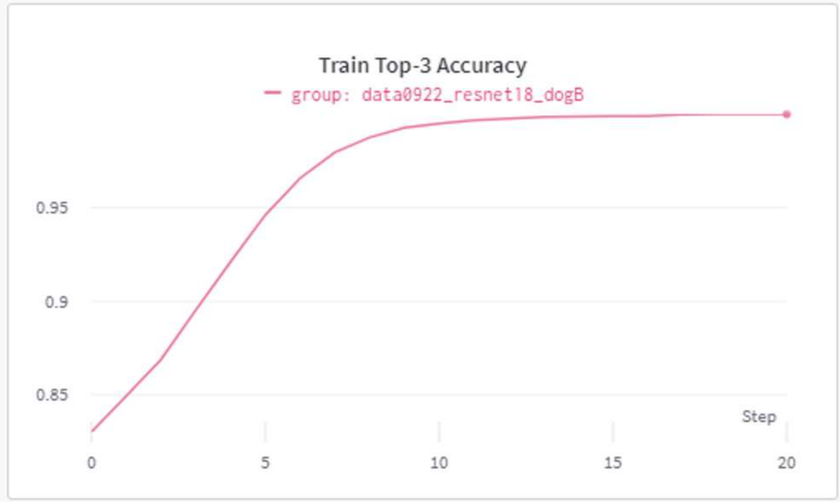


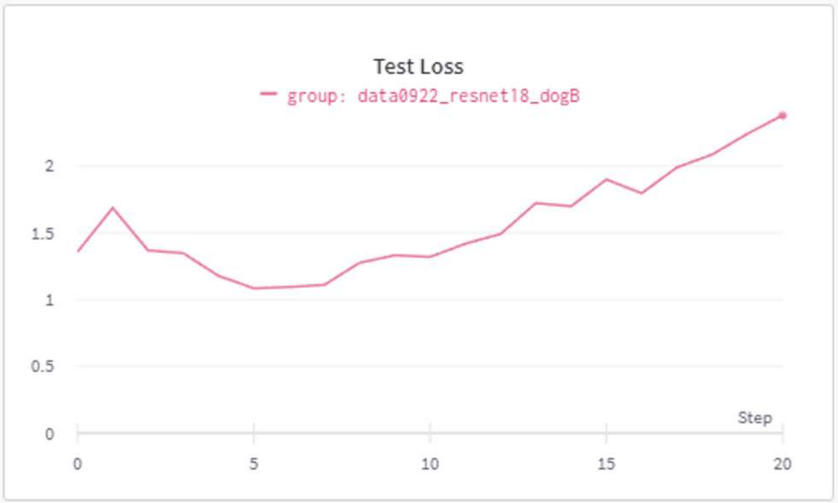
Train

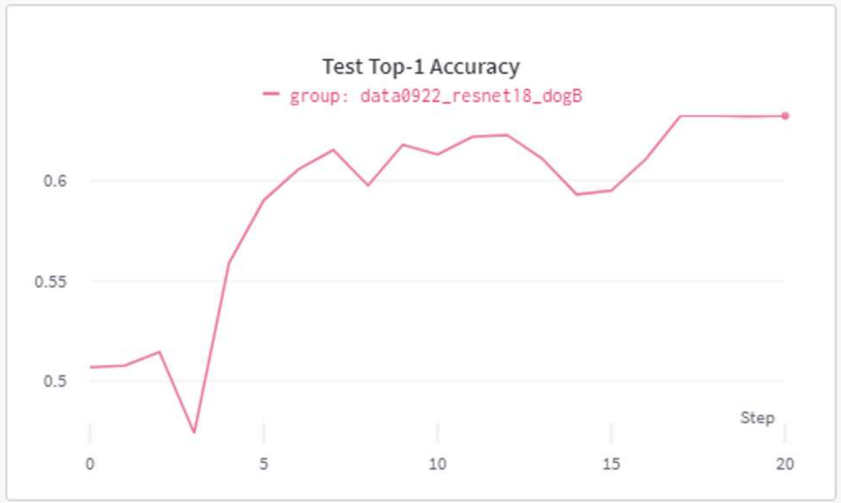
learning rate	1e-3	Loss	BinaryCrossEntropy
epoch	100 (1epoch:5h)	optimizer	Adam
batch_size	64	scheduler	ReduceLROnPlateau

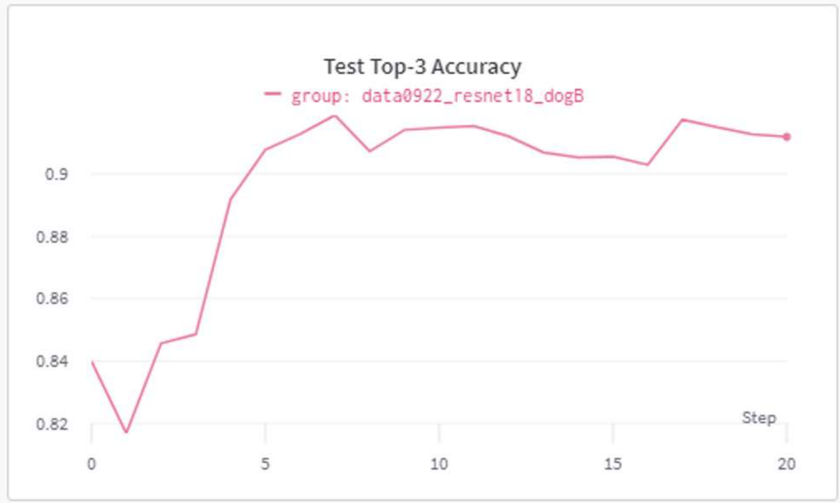




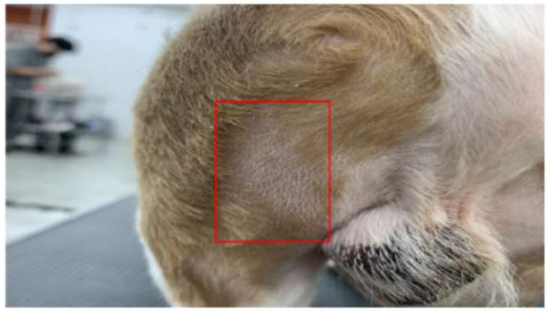
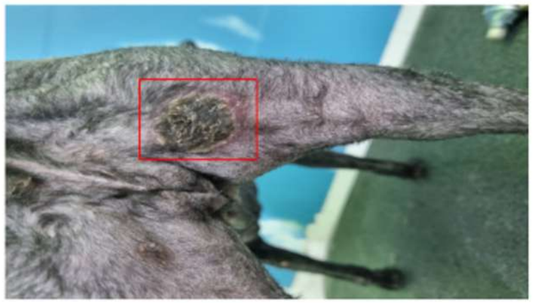








Inference

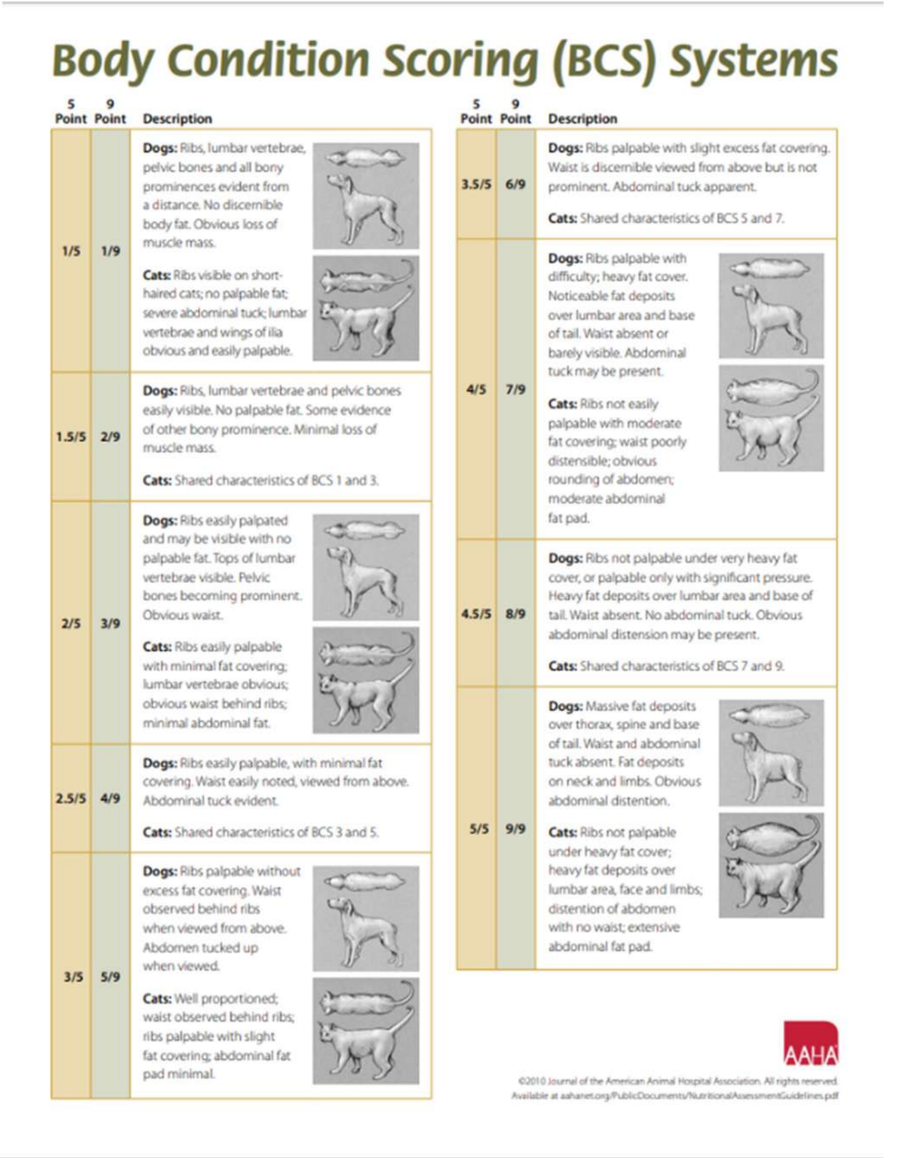
구진,플라크	비듬,각질,상피성잔고리	태선화,과다색소침착
		
농포,여드름	미란,궤양	결절,종괴
		

BCS란?

BMI : kg / m2 (체질량 지수) 인간의 비만 판정 지표

BCS : Body Condition Score (신체 충실 지수) 가축의 비만 판정 지표

측정 방법 : 외형으로 평가한다. 만져보기, 위에서 보기, 옆에서 보기



Body Condition Scoring (BCS) Systems

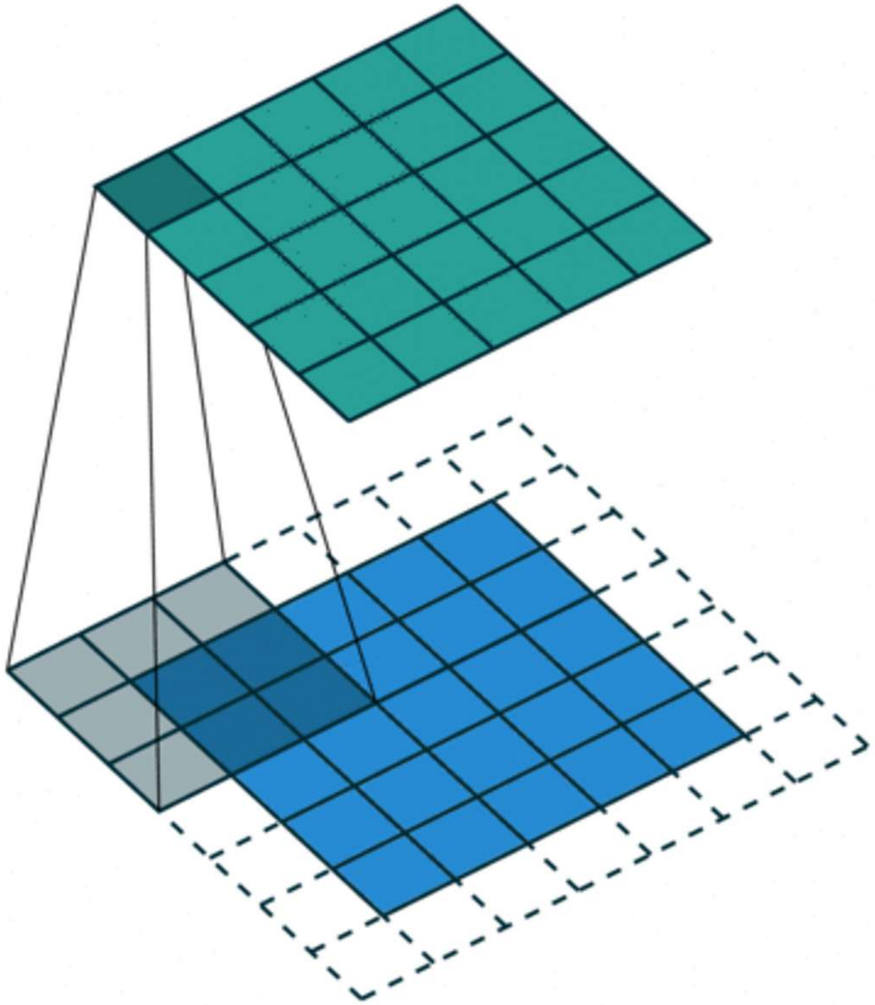
5 Point	9 Point	Description
1/5	1/9	**Dogs:** Ribs, lumbar vertebrae, pelvic bones and all bony prominences evident from a distance. No discernible body fat. Obvious loss of muscle mass. **Cats:** Ribs visible on short-haired cats; no palpable fat; severe abdominal tuck; lumbar vertebrae and wings of ilia obvious and easily palpable.
1.5/5	2/9	**Dogs:** Ribs, lumbar vertebrae and pelvic bones easily visible. No palpable fat. Some evidence of other bony prominence. Minimal loss of muscle mass. **Cats:** Shared characteristics of BCS 1 and 3.
2/5	3/9	**Dogs:** Ribs easily palpated and may be visible with no palpable fat. Tops of lumbar vertebrae visible. Pelvic bones becoming prominent. Obvious waist. **Cats:** Ribs easily palpable with minimal fat covering; lumbar vertebrae obvious; obvious waist behind ribs; minimal abdominal fat.
2.5/5	4/9	**Dogs:** Ribs easily palpable, with minimal fat covering. Waist easily noted, viewed from above. Abdominal tuck evident. **Cats:** Shared characteristics of BCS 3 and 5.
3/5	5/9	**Dogs:** Ribs palpable without excess fat covering. Waist observed behind ribs when viewed from above. Abdomen tucked up when viewed. **Cats:** Well proportioned; waist observed behind ribs; ribs palpable with slight fat covering; abdominal fat pad minimal.
3.5/5	6/9	**Dogs:** Ribs palpable with slight excess fat covering. Waist is discernible viewed from above but is not prominent. Abdominal tuck apparent. **Cats:** Shared characteristics of BCS 5 and 7.
4/5	7/9	**Dogs:** Ribs palpable with difficulty; heavy fat cover. Noticeable fat deposits over lumbar area and base of tail. Waist absent or barely visible. Abdominal tuck may be present. **Cats:** Ribs not easily palpable with moderate fat covering; waist poorly distensible; obvious rounding of abdomen; moderate abdominal fat pad.
4.5/5	8/9	**Dogs:** Ribs not palpable under very heavy fat cover, or palpable only with significant pressure. Heavy fat deposits over lumbar area and base of tail. Waist absent. No abdominal tuck. Obvious abdominal distension may be present. **Cats:** Shared characteristics of BCS 7 and 9.
5/5	9/9	**Dogs:** Massive fat deposits over thorax, spine and base of tail. Waist and abdominal tuck absent. Fat deposits on neck and limbs. Obvious abdominal distention. **Cats:** Ribs not palpable under heavy fat cover; heavy fat deposits over lumbar area, face and limbs; distention of abdomen with no waist; extensive abdominal fat pad.

AAHA

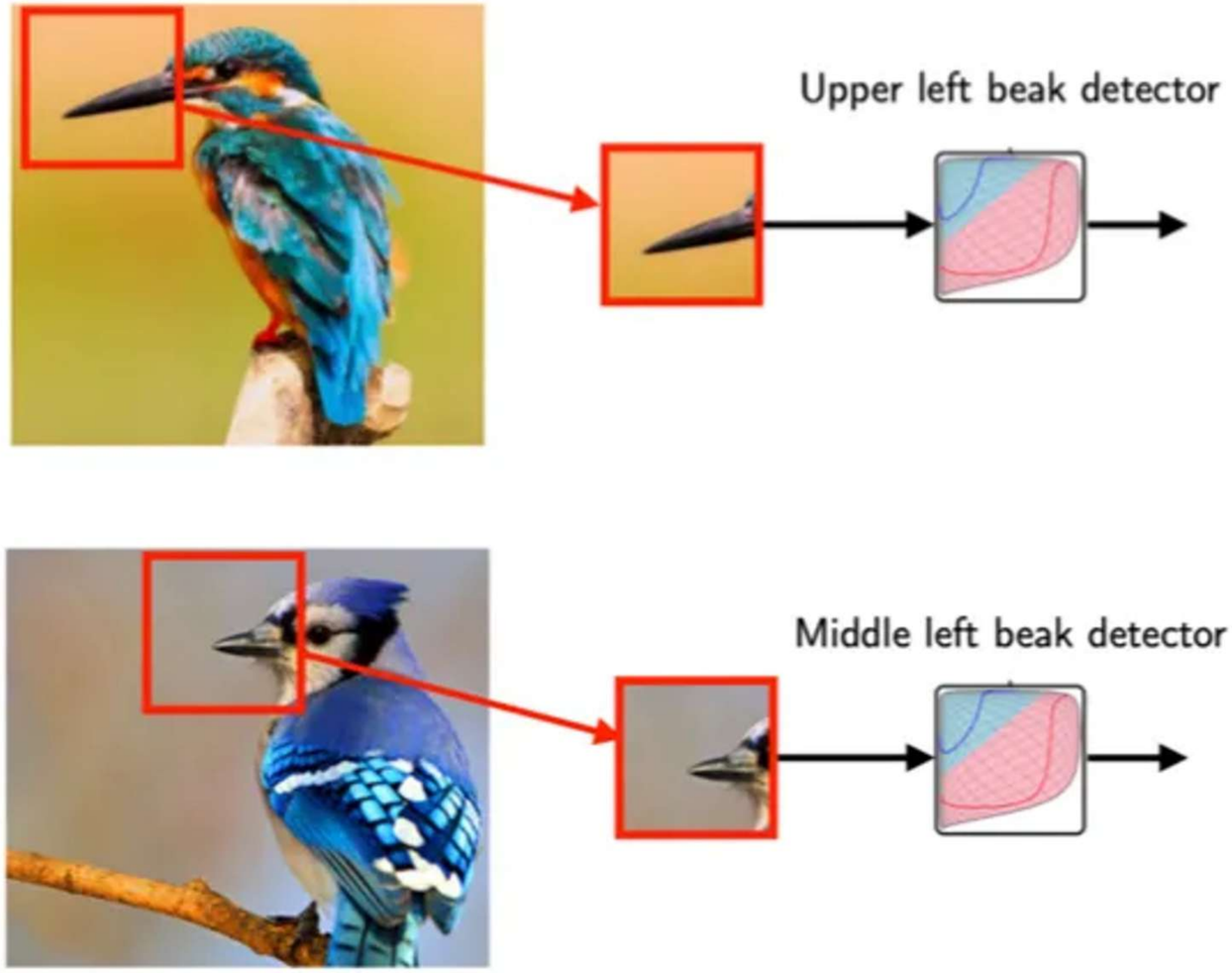
Data

BCS 5인 강아지의 전신 사진

2D CNN

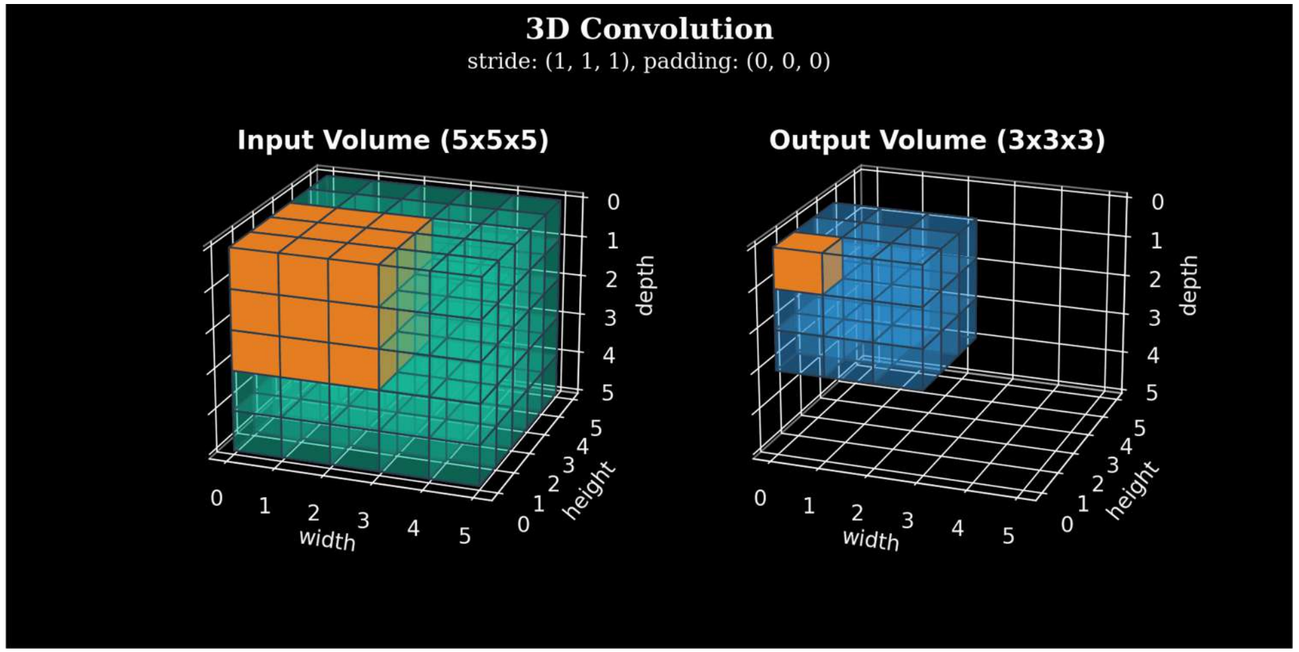


2D convolution

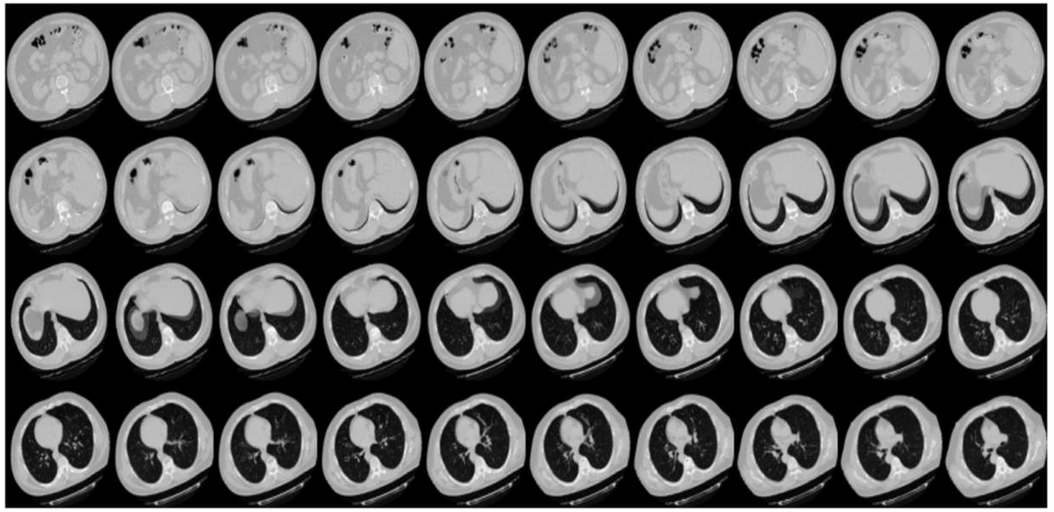


새 판별

3D CNN

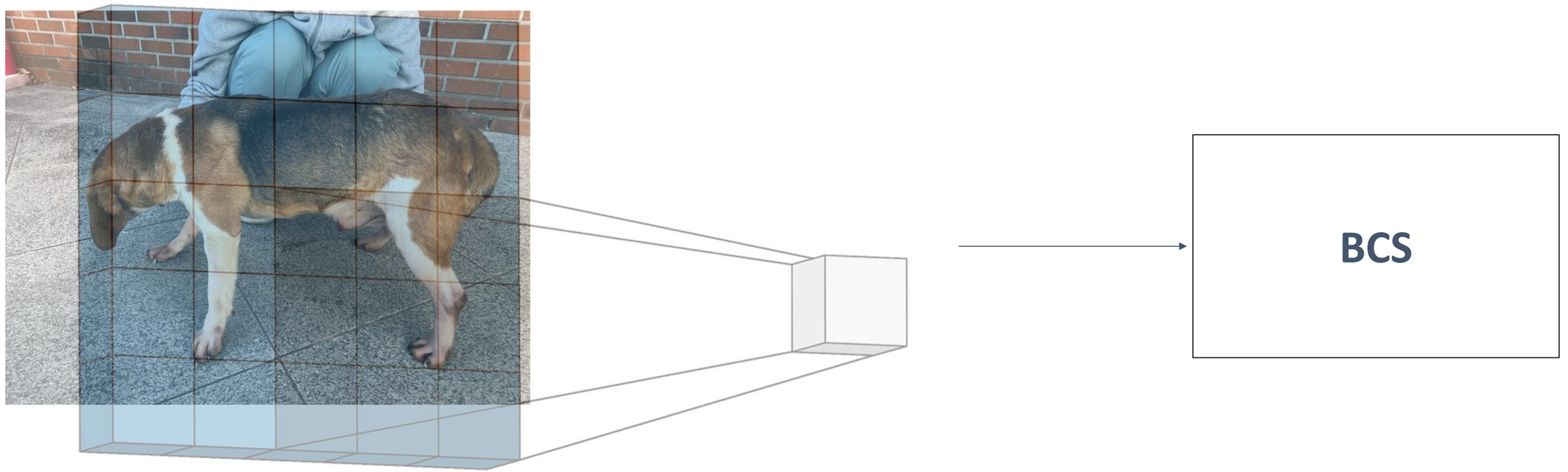


3D convolution



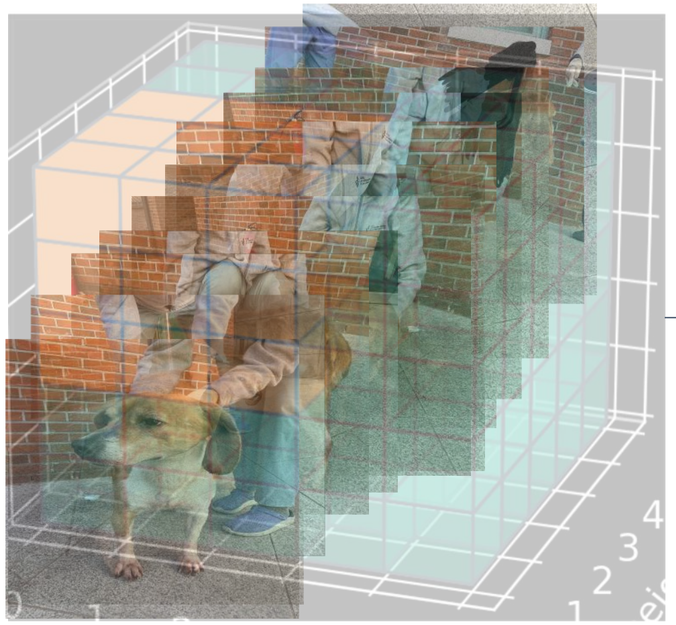
CT Image

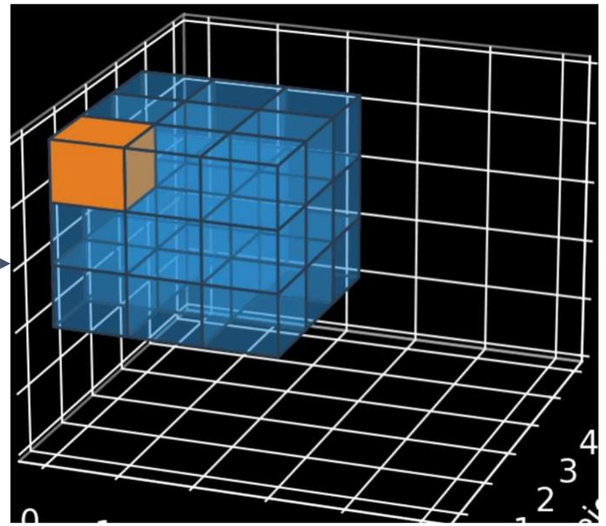
Method　2D CNN



강아지의 **팔, 몸통, 다리** 특징을 학습하여 강아지 또는 비만도 판별

Method 3D CNN





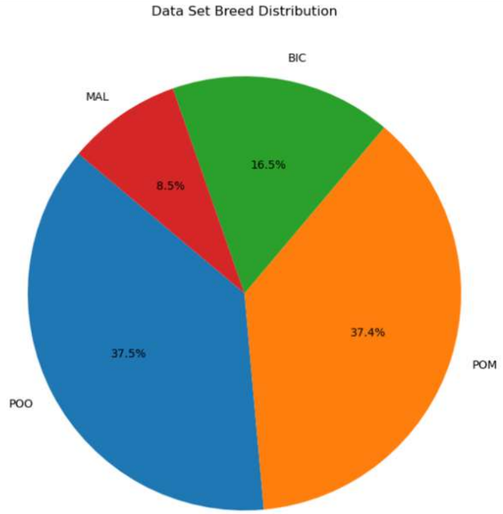
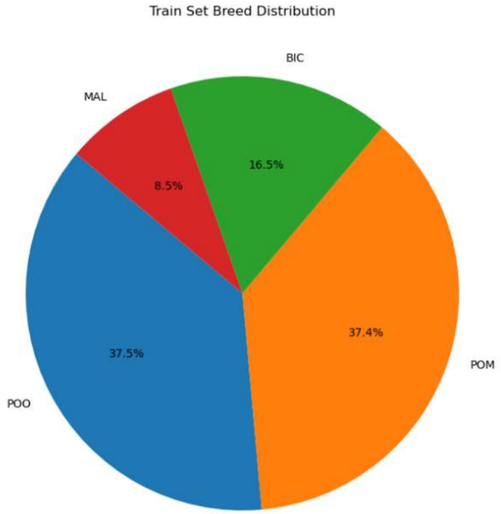
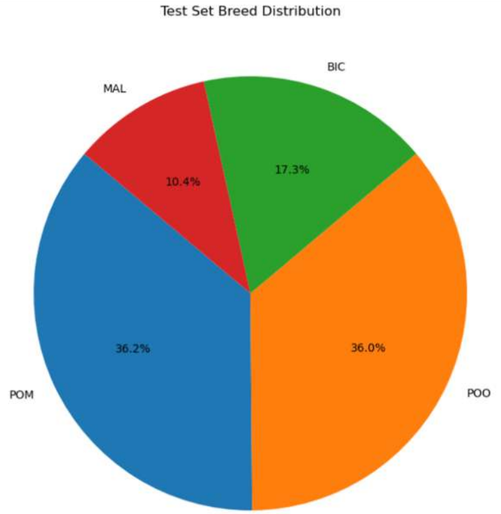
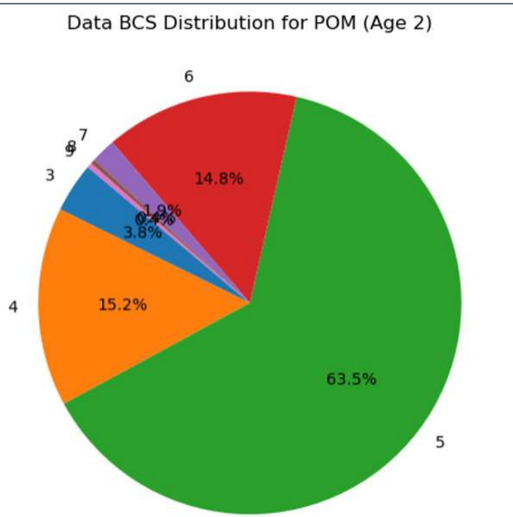
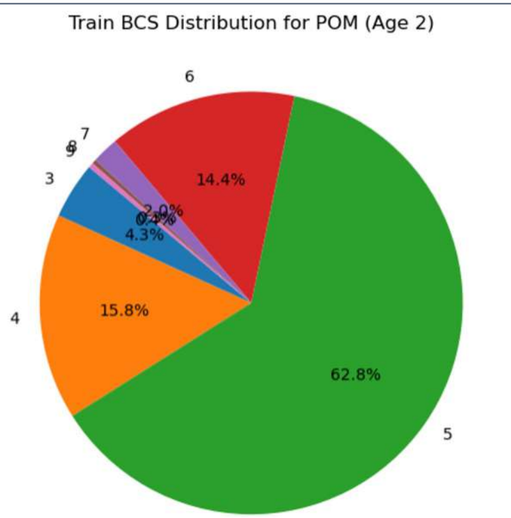
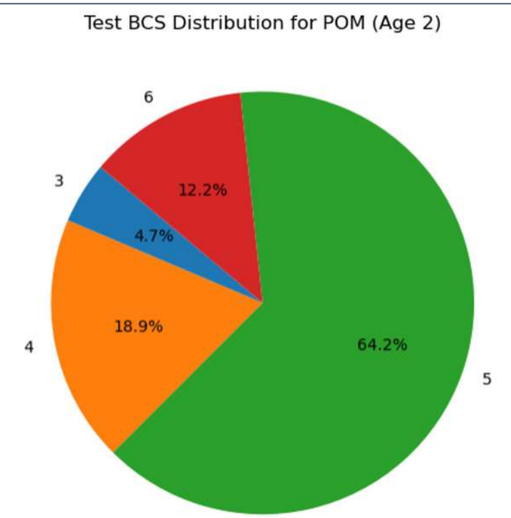
BCS

강아지의 **입체적** 특징을 학습하여 비만도 판별

Problem

1. Data Analysis	2. Model	3. Data Imbalance	4. regression
5. Data Lack	6. Age Information	7. Data Augmentation	8. Crop

1. Data Analysis

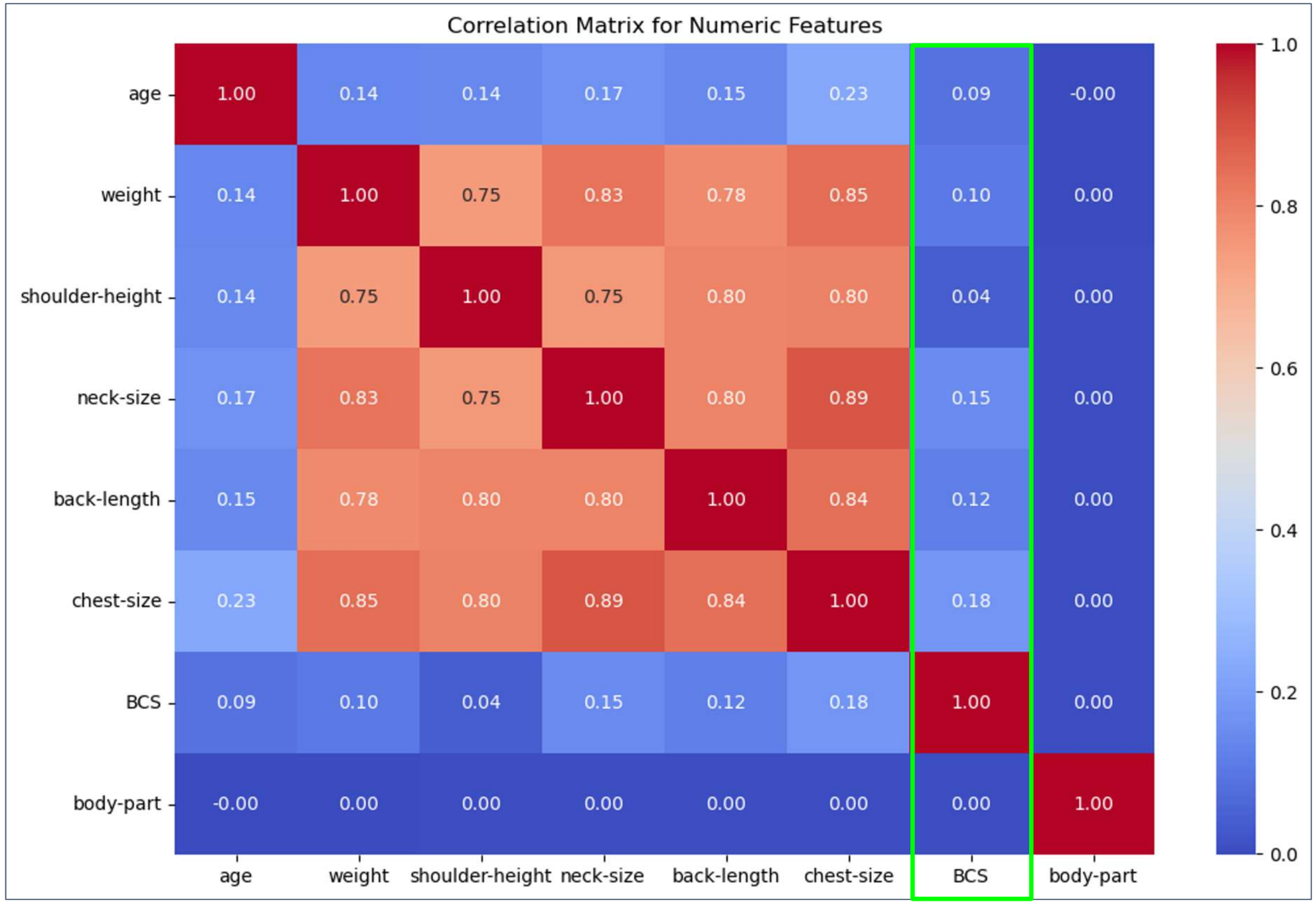
	All	Train	Test
Breed			
BCS			

데이터의 분포 그래프

종 별 분포

BCS 별 분포

1. Data Analysis



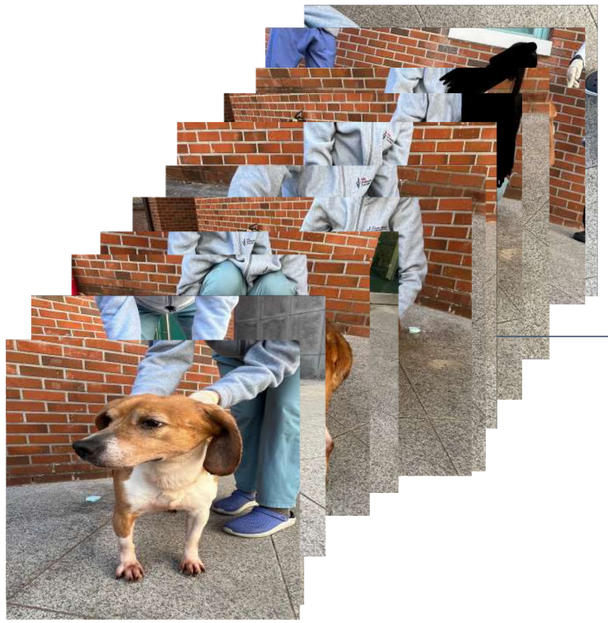
두 변수가 종속적
ex) 키 ~ 몸무게

두 변수가 독립적
ex) 키 ~ 시력

BCS는 독립적이다.

Problem

1. Data Analysis	2. Model	3. Data Imbalance	4. Regression
4. data lack	6. Age Information	7. Data Augmentation	8. Crop

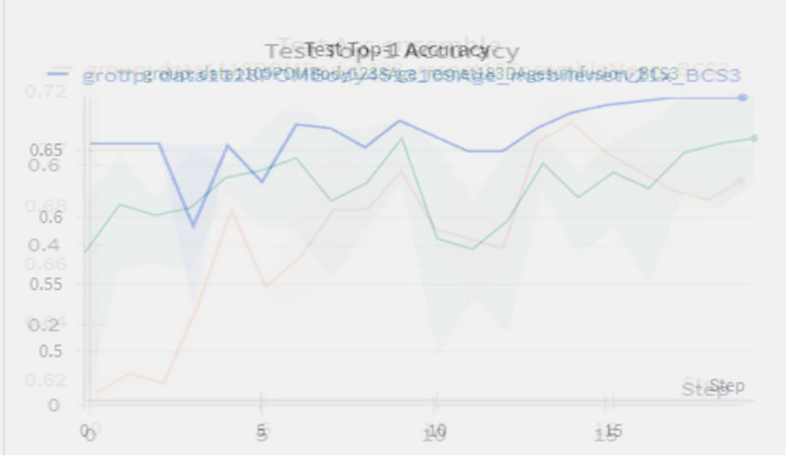


Black Box

저체중(1-4)
정상(5)
과체중(6-9)

2. Model

	accuracy	time
MobileNet	**0.7914**	**1sec**
ResNet18	0.7551	4sec
Ensemble	0.7010	6sec
2D	0.6242	4sec



2. MobileNetv2

Resource Efficient 3D Convolutional Neural Networks

Okan Köpüklü[1], Neslihan Kose[2], Ahmet Gunduz[1], Gerhard Rigoll[1]

[1] Institute for Human-Machine Communication, TU Munich, Germany

[2] Dependability Research Lab, Intel Labs Europe, Intel Deutschland GmbH, Germany

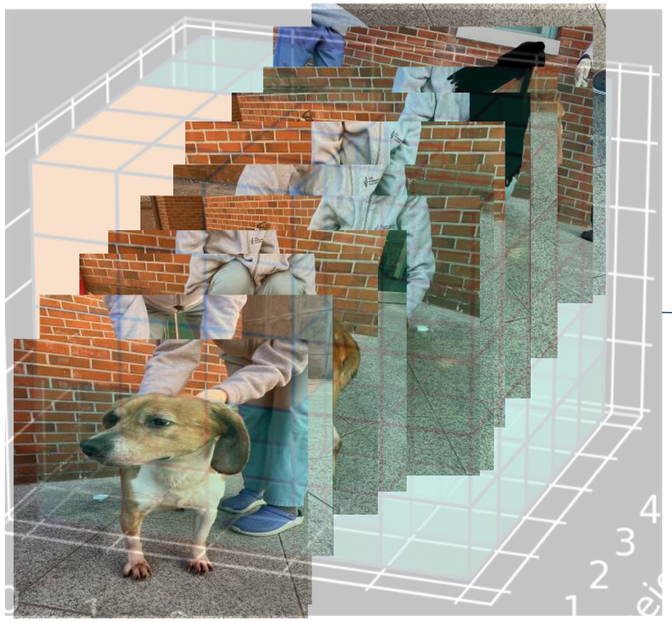
Model	MFLOPs	Params	Speed (cps)		Accuracy (%)		
			Titan XP	Jetson TX2	Kinetics-600	Jester	UCF-101
3D-ShuffleNetV1 0.5x	78	0.55M	398	69	35.51	89.23	64.39
3D-ShuffleNetV2 0.25x	116	0.83M	442	82	25.73	86.91	56.52
3D-MobileNetV1 0.5x	98	1.17M	290	57	31.74	87.61	62.17
3D-MobileNetV2 0.2x	63	0.96M	357	42	24.14	86.43	55.56
3D-ShuffleNetV1 1.0x	199	1.52M	269	49	45.31	92.27	76.00
3D-ShuffleNetV2 1.0x	195	1.91M	243	44	46.10	91.96	77.90
3D-MobileNetV1 1.0x	241	3.91M	164	31	40.07	90.81	70.95
3D-MobileNetV2 0.45x	177	1.40M	203	19	36.47	90.21	68.31
3D-ShuffleNetV1 1.5x	347	2.92M	204	31	52.75	93.12	81.73
3D-ShuffleNetV2 1.5x	291	3.16M	186	34	52.05	93.16	82.32
3D-MobileNetV1 1.5x	429	8.22M	116	19	48.24	91.28	76.00
3D-MobileNetV2 0.7x	325	2.05M	130	13	45.59	93.34	77.32
3D-ShuffleNetV1 2.0x	538	4.76M	161	24	56.84	93.54	84.96
3D-ShuffleNetV2 2.0x	438	6.64M	146	26	55.17	93.71	83.32
3D-MobileNetV1 2.0x	662	14.10M	88	15	48.53	92.56	76.18
3D-MobileNetV2 1.0x	561	3.12M	93	9	50.65	94.59	81.60
3D-SqueezeNet	926	2.15M	682	46	40.52	90.77	74.94
ResNet-18	8323	33.36M	334	17	57.65	93.34	80.09
ResNet-50	9835	44.54M	183	11	63.00	93.70	88.92
ResNet-101	13664	83.58M	142	8	64.18	94.10	87.02
ResNeXt-101	9652	48.75M	122	7	68.30	94.89	89.08
I3D [2]	111331	12.70M	—	—	71.90	—	—

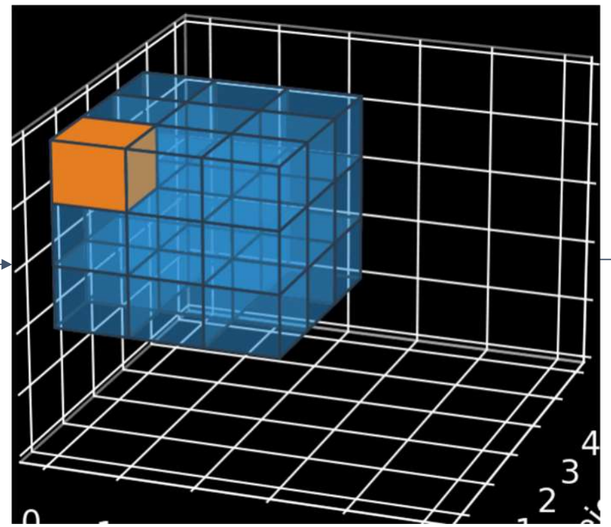
Table 8: Comparison of resource efficient 3D architectures over video classification accuracy, number of parameters and speed on two different platforms and four levels of computation complexity. The calculations of MFLOPs, parameters and speeds are done for Kinetics-600 benchmark. For speed calculations (clips per second (cps)), the used platforms are Titan Xp and Jetson TX2; and the batch size is set to 8. All models takes 16 frames input with 112 x 112 spatial resolution except for I3D, which takes 64 frames input with 224 x 224 spatial resolution.

1. parameter 10배 적음
1. 정확도는 유사

Problem

1. Data Analysis	2. Model	3. Data Imbalance	4. Regression
5. data lack	6. Age Information	7. Data Augmentation	8. Crop

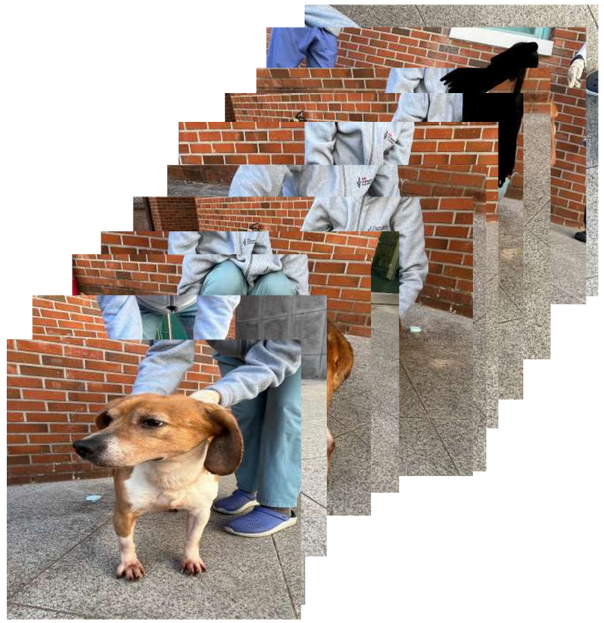




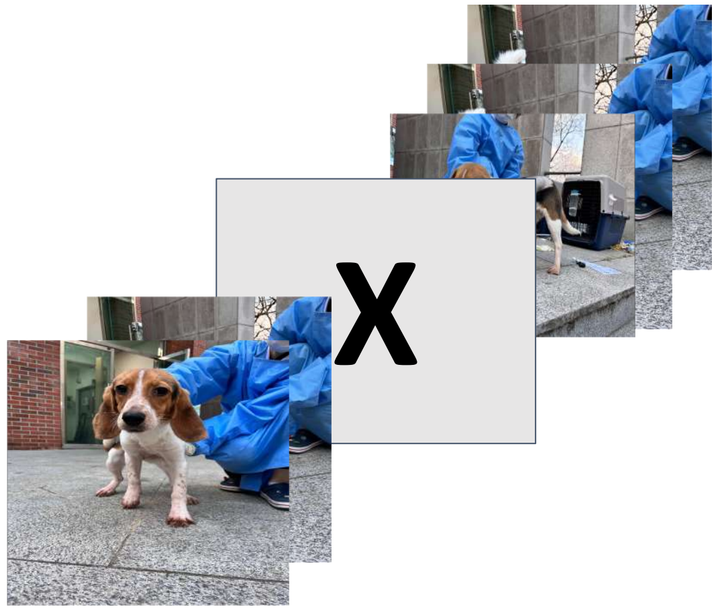
MobileNetv2

저체중(1-4)
정상(5)
과체중(6-9)

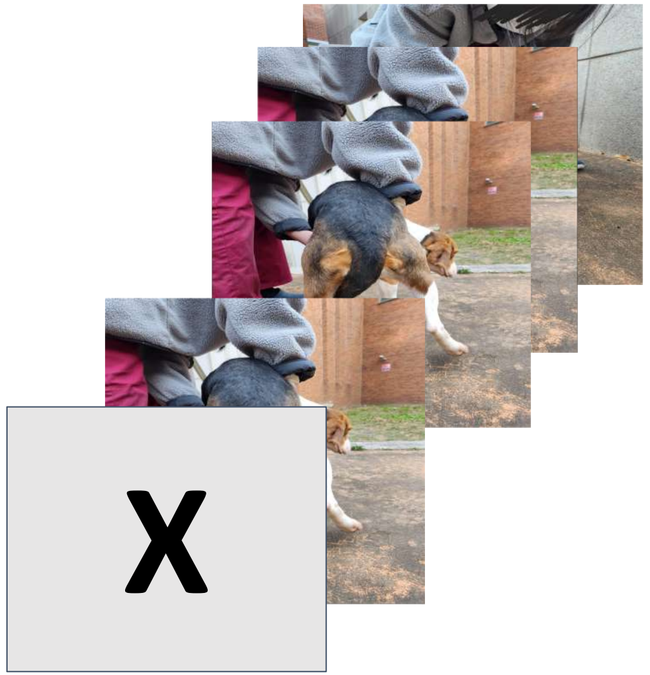
3. Data Imbalance



1~13 모두 존재

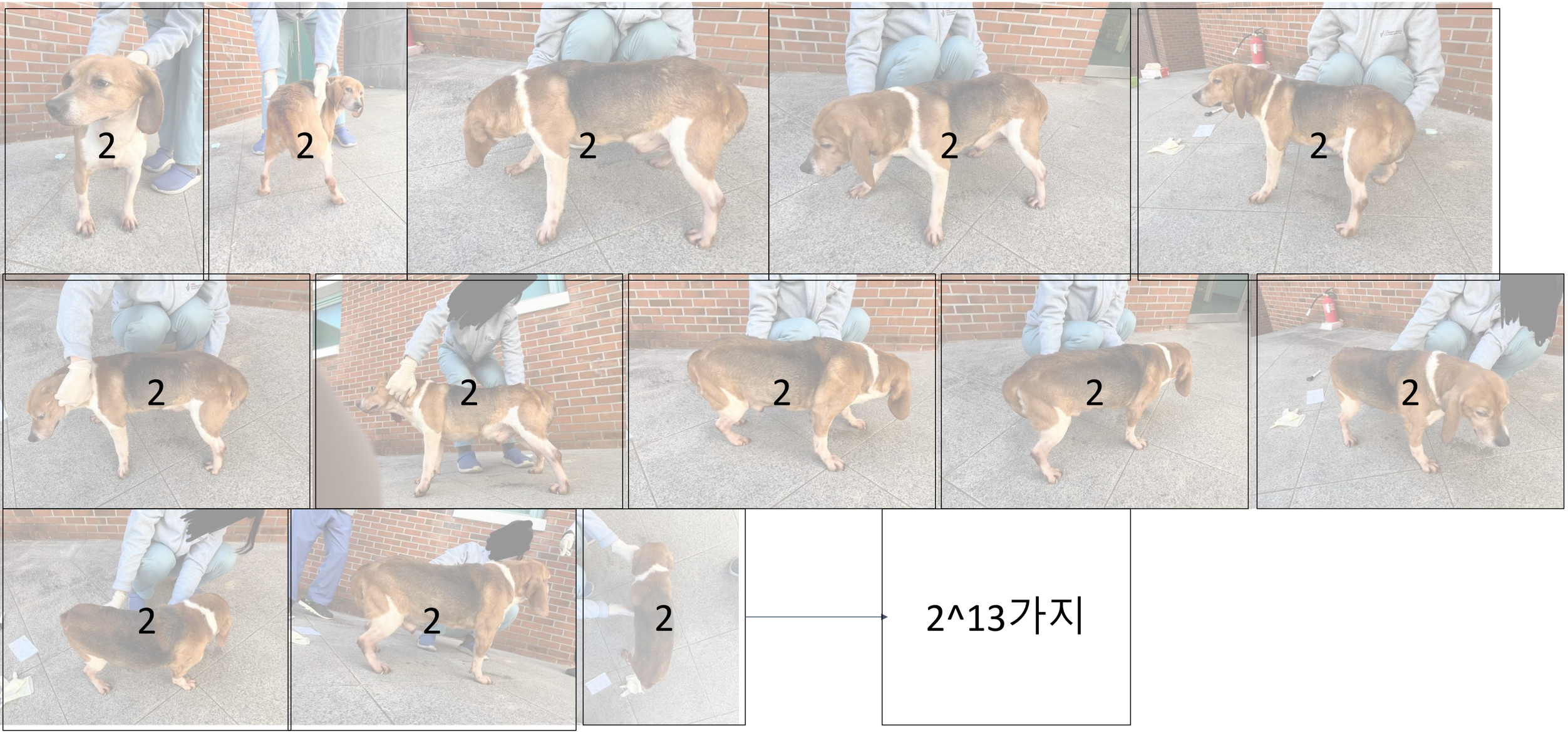


3, 4, 7 이미지 없음



1, 2, 3 이미지 없음

3. Data Imbalance



3. Data Imbalance

3. weighted score

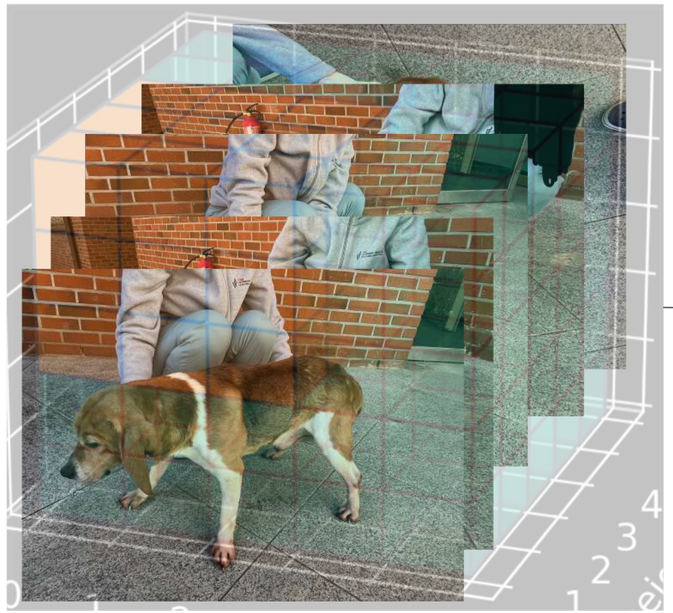
$$score = len(part) * len(valid)$$

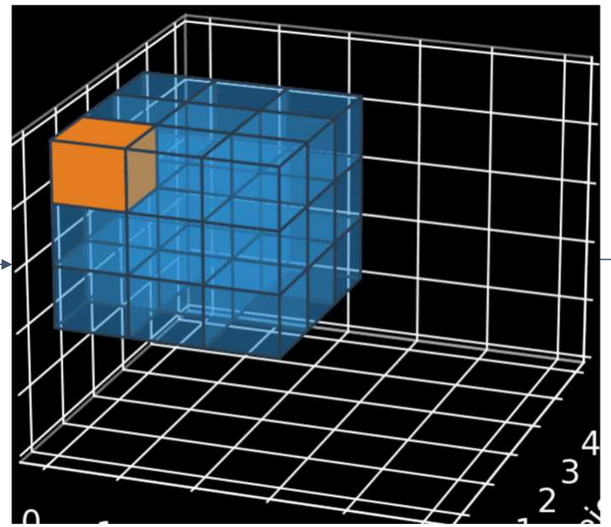
24175 = 5 X 4835

Combination	Score
(4, 5, 9, 10, 13)	24175
(4, 5, 9, 10, 12)	23505
(4, 5, 8, 9, 10)	23455
(5, 9, 10, 12, 13)	23430
(4, 9, 10, 12, 13)	23415
…	…
(3, 11, 12)	5901
(3, 6, 7)	5793
(3, 7, 11)	5769

Problem

1. Data Analysis	2. Model	3. Data Imbalance	4. Regression
5. Data lack	6. Age Information	7. Data Augmentation	8. Crop

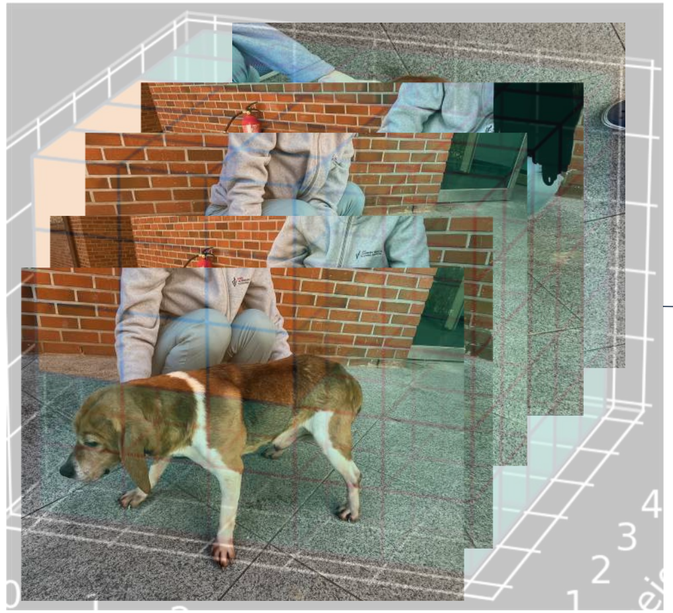


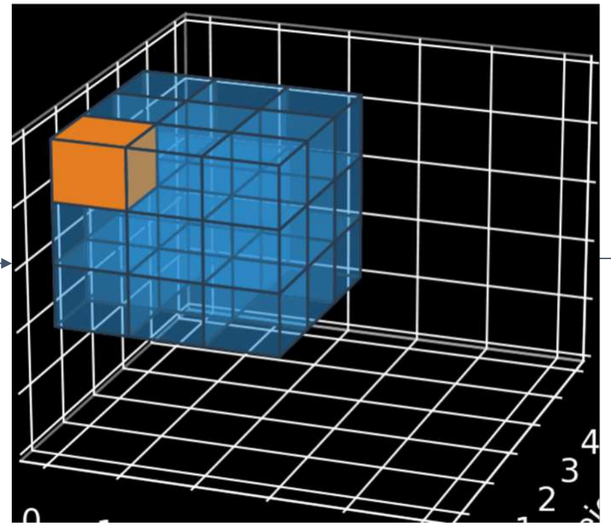


MobileNetv2

저체중(1-4)
정상(5)
과체중(6-9)

4. Regression





MobileNetv2

BCS

4. Regression

MSE loss

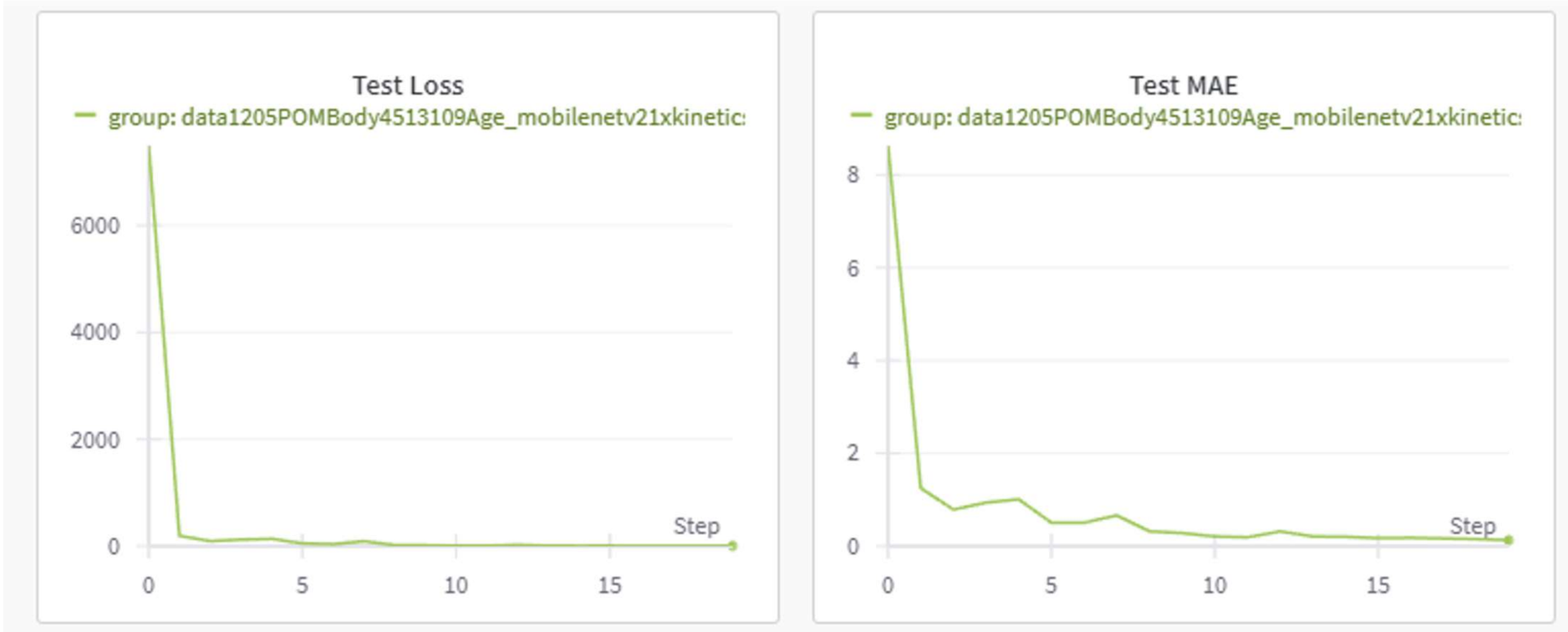
$$Loss = \frac{1}{n}\sum(truth - prcd)^2$$

weighted MSE

$$Loss = \frac{1}{n}\sum 10 * (truth - prcd)^2$$

truth : 5

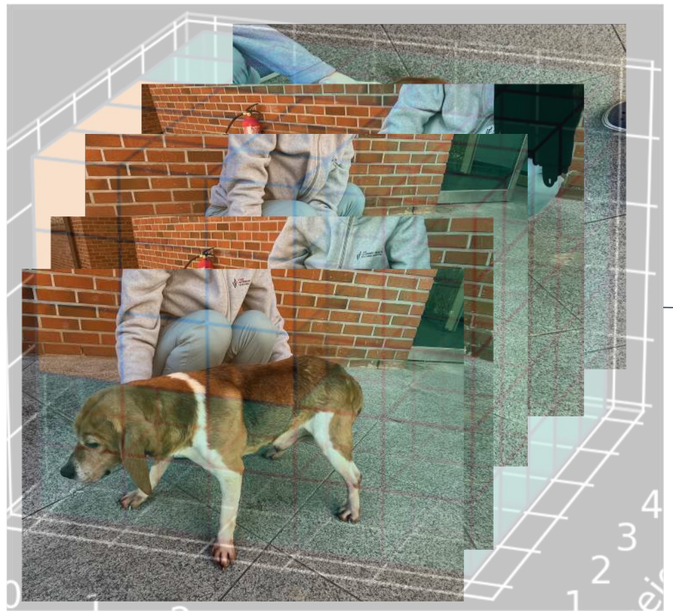
predict : 5.5

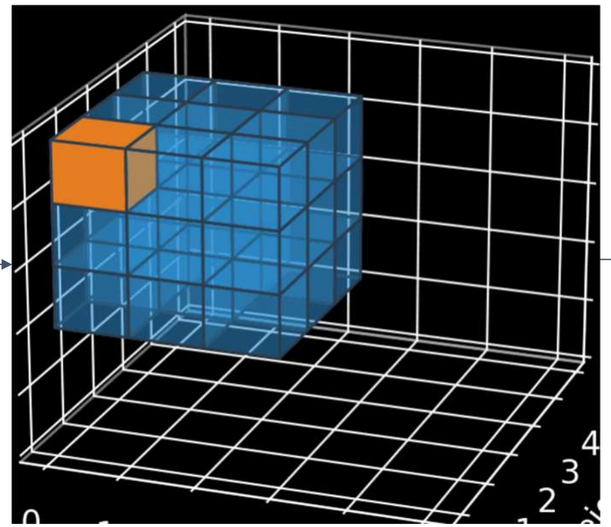


| 실제 - 예측 | < 0.5

Problem

1. Data Analysis	2. Model	3. Data Imbalance	4. Regression
5. Data lack	6. Age Information	7. Data Augmentation	8. Crop



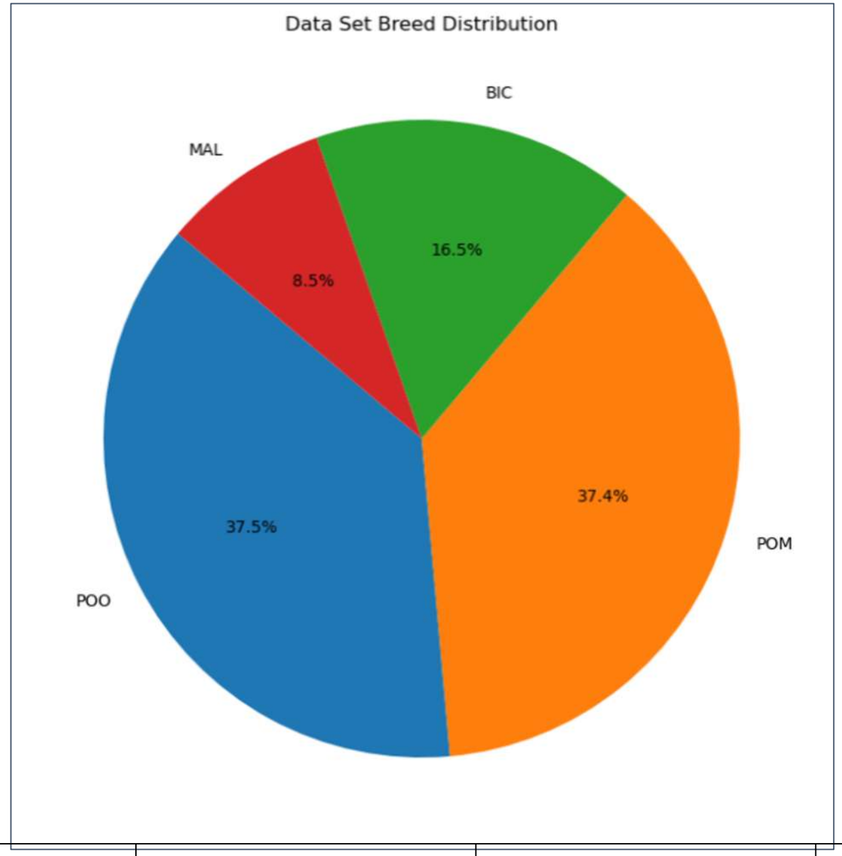


MobileNetv2

BCS

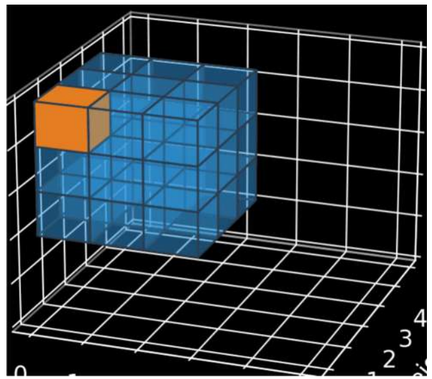
5. Data Lack

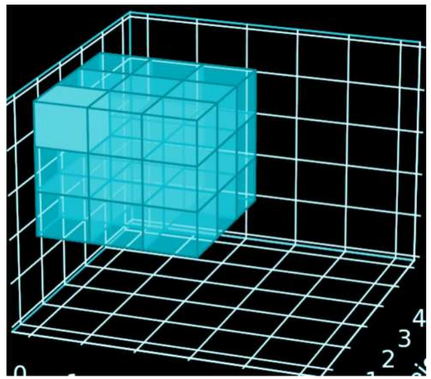
종 별 데이터 분포

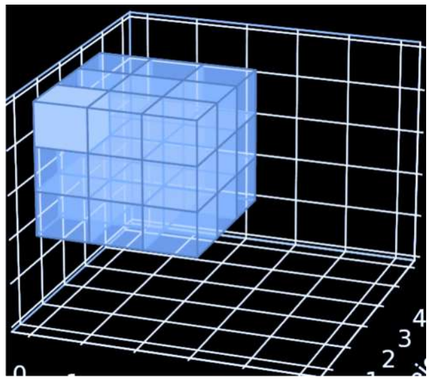


Breed	POM	POO	BIC	MAL	Total
Data length	24175	21175	16175	4654	66179

5. Fine-Tuning







Origin Model

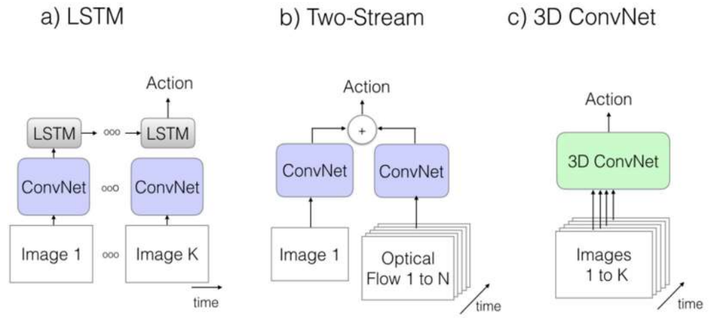
pre trained MODEL

fine tuned MODEL

5. Fine-Tuning

The Kinetics Human Action Video Dataset

Will Kay wkay@google.com
João Carreira joaoluis@google.com
Karen Simonyan simonyan@google.com
Brian Zhang brianzhang@google.com
Chloe Hillier chillier@google.com
Sudheendra Vijayanarasimhan svnaras@google.com
Fabio Viola fviola@google.com
Tim Green tfgg@google.com
Trevor Back back@google.com
Paul Natsev natsev@google.com
Mustafa Suleyman mustafasul@google.com
Andrew Zisserman zisserman@google.com



Architecture	UCF-101			HMDB-51			Kinetics		
	RGB	Flow	RGB+Flow	RGB	Flow	RGB+Flow	RGB	Flow	RGB+Flow
(a) ConvNet+LSTM	84.3	–	–	43.9	–	–	57.0 / 79.0	–	–
(b) Two-Stream	84.2	85.9	92.5	51.0	56.9	63.7	56.0 / 77.3	49.5 / 71.9	61.0 / 81.3
(c) 3D-ConvNet	51.6	–	–	24.3	–	–	56.1 / 79.5	–	–

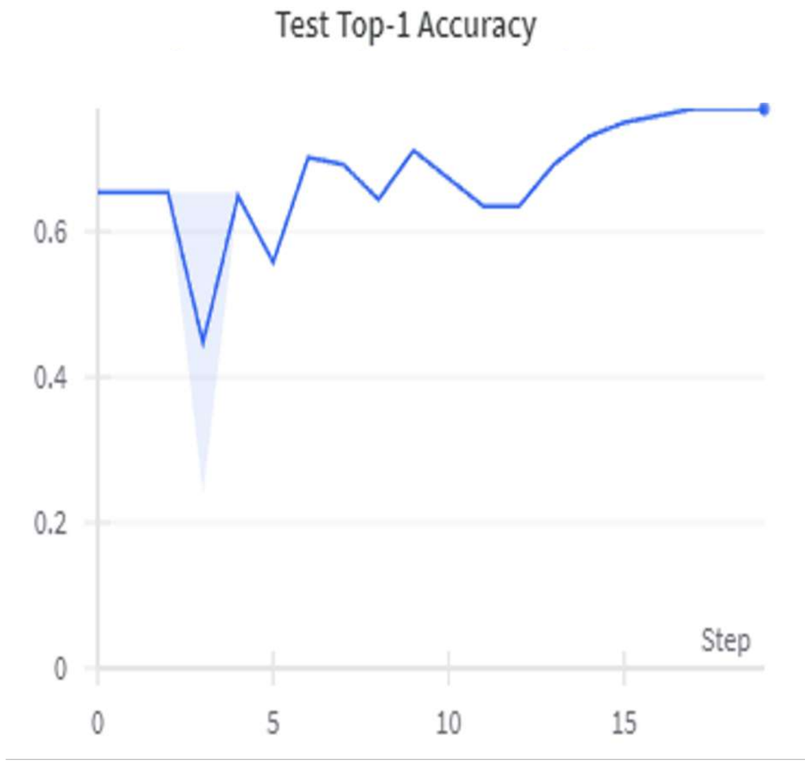
Table 4: Baseline comparisons across datasets: (left) training and testing on split 1 of UCF-101; (middle) training and testing on split 1 of HMDB-51; (right) training and testing on Kinetics (showing top-1/top-5 performance). ConvNet+LSTM and Two-Stream use ResNet-50 ConvNet modules, pretrained on ImageNet for UCF-101 and HMDB-51 examples but not for the Kinetics experiments. Note that the Two-Stream architecture numbers on individual RGB and Flow streams can be interpreted as a simple baseline which applies a ConvNet independently on 25 uniformly sampled frames then averages the predictions.

3D - Conv에서 성능 높음

충분하고 일반화 된 데이터

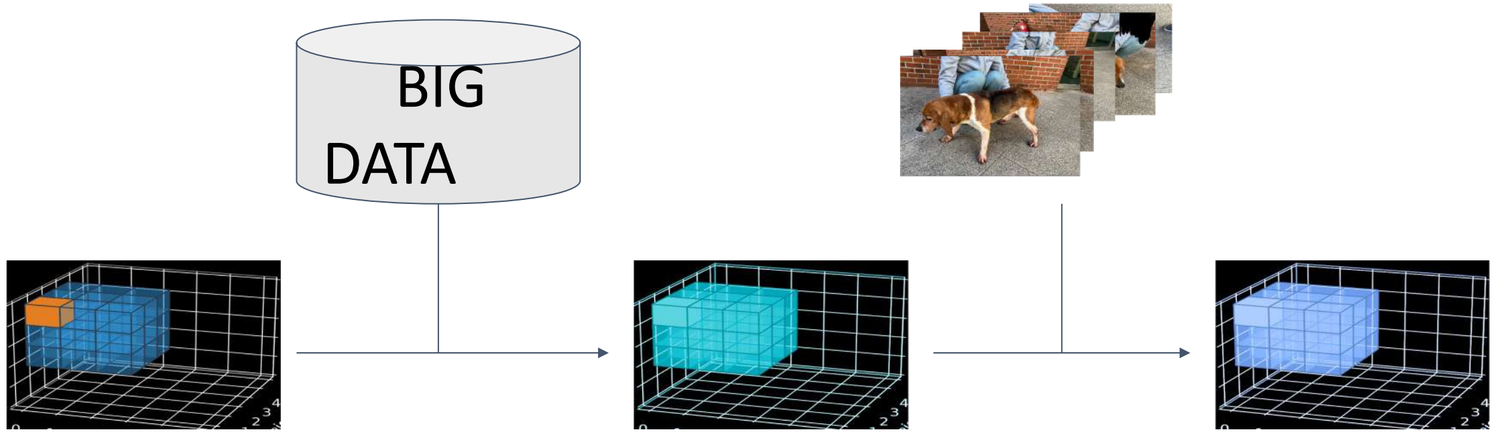
5. Fine-Tuning

method	**accuracy**
Fine tuning	**0.8431**
None	0.7914



Problem

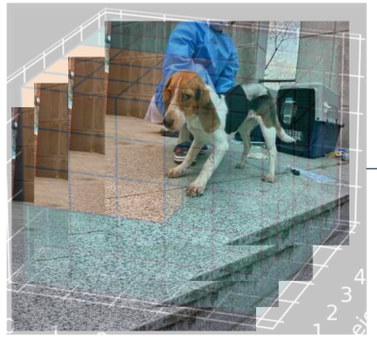
1. Data Analysis	2. Model	3. Data Imbalance	4. regression
5. data lack	6. Age Information	7. Data Augmentation	8. Crop

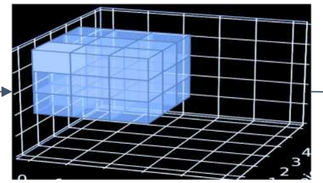


Origin mobilenetv2

pre trained mobilenetv2

fine tuned mobilenetv2

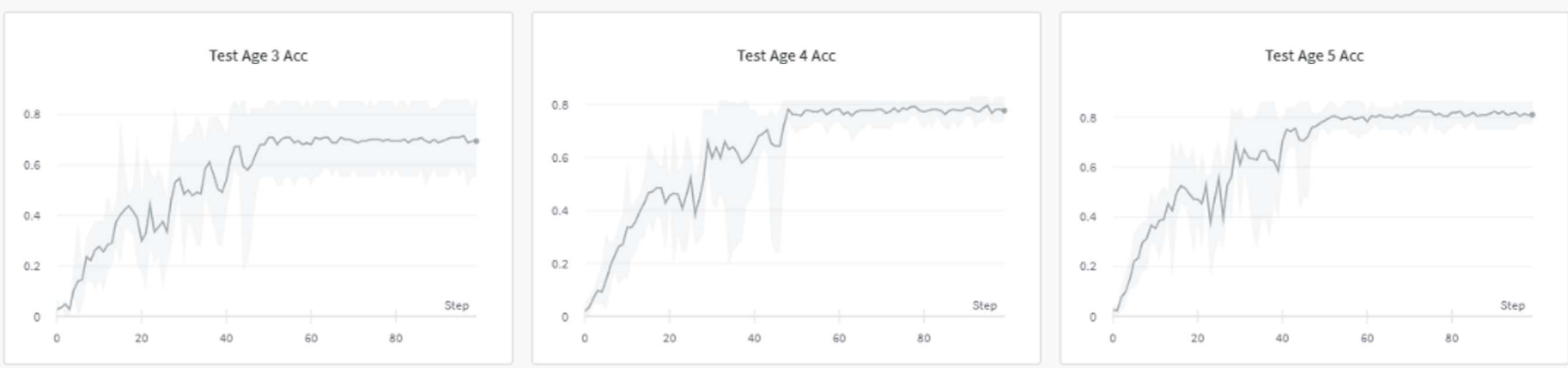




fine tuned mobilenetv2

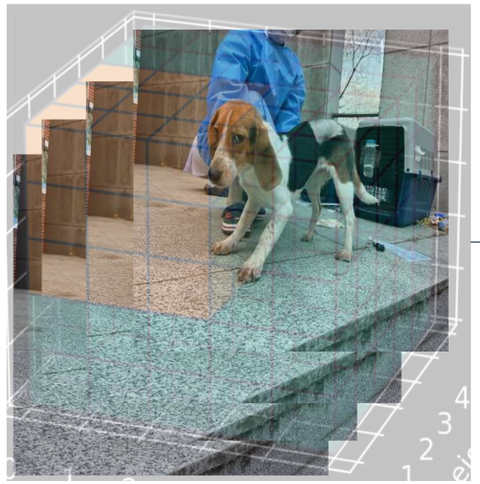
BCS

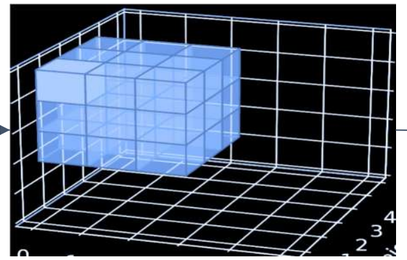
6. Age information



나이에 따른 정확도 그래프 , 나이가 커질수록 분산 감소

6. Age addition





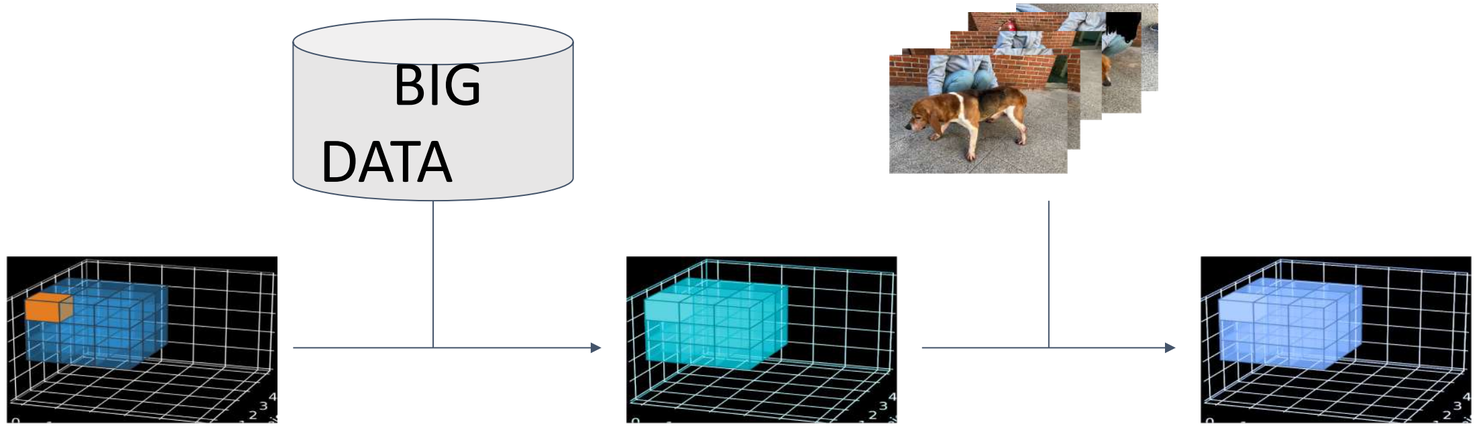
fine tuned mobilenetv2

BCS

Age

Problem

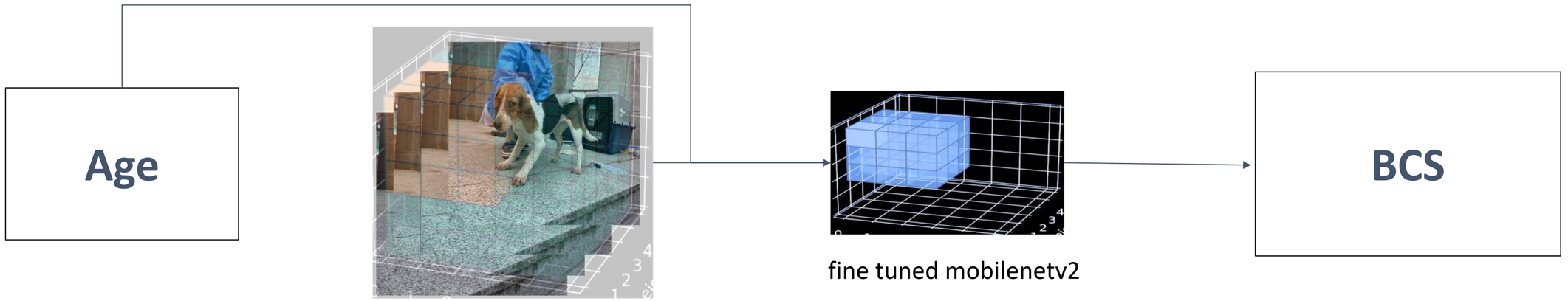
1. Data Analysis	2. Model	3. Data Imbalance	4. Regression
5. Data Lack	6. Age Information	7. Data Augmentation	8. Crop



Origin mobilenetv2

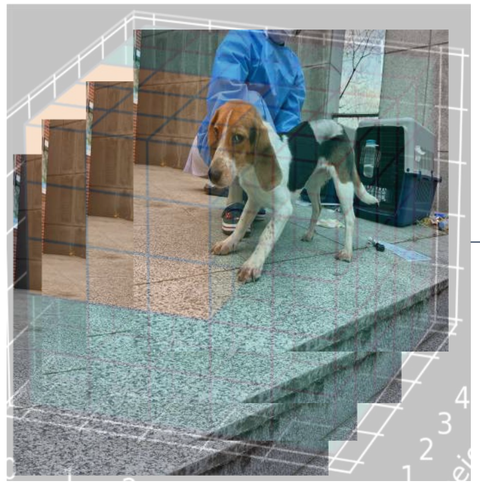
pre trained mobilenetv2

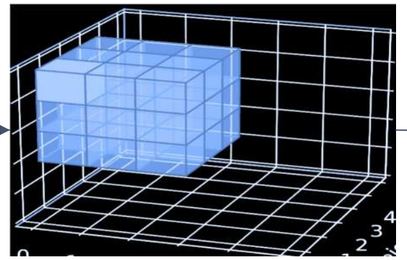
fine tuned mobilenetv2



fine tuned mobilenetv2

7. Data augmentation



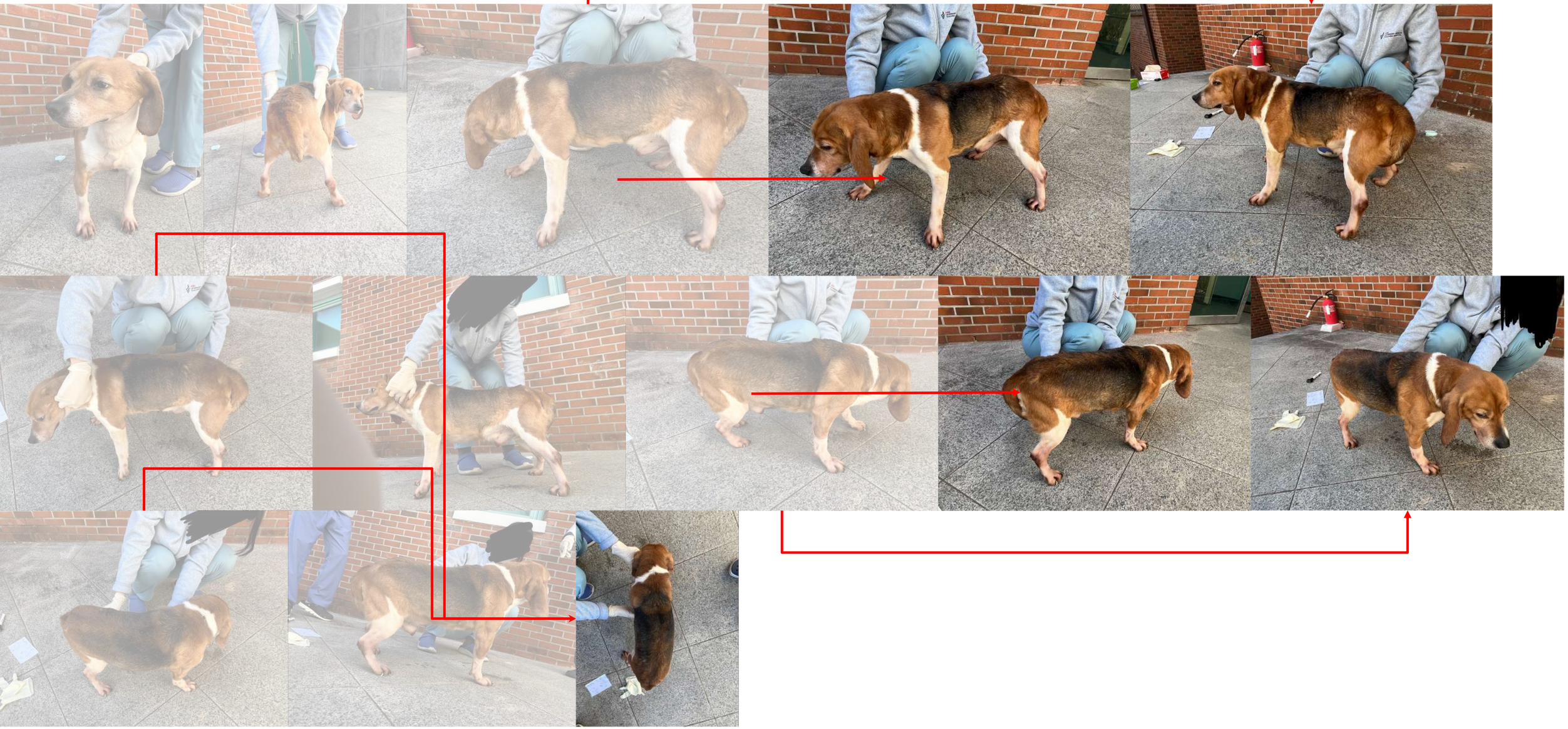


fine tuned mobilenetv2

BCS

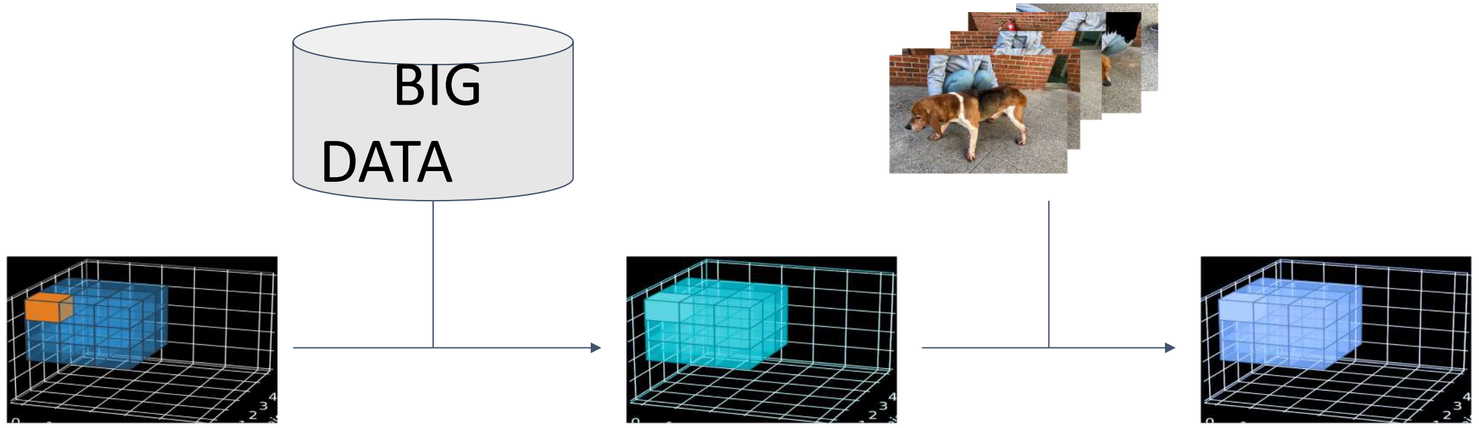
Age

7. Data Augmentation



Problem

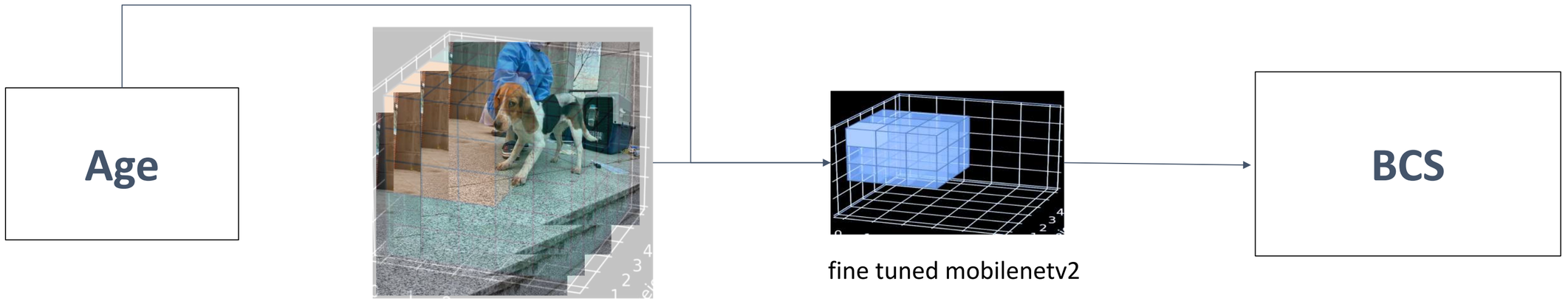
1. Data Analysis	2. Model	3. Data Imbalance	4. Regression
5. Data Lack	6. Age Information	7. Data Augmentation	8. Crop



Origin mobilenetv2

pre trained mobilenetv2

fine tuned mobilenetv2



fine tuned mobilenetv2

프로젝트 차별성

프로젝트 차별성 1 - 비만도 진단

유사 서비스: 멍냥보감

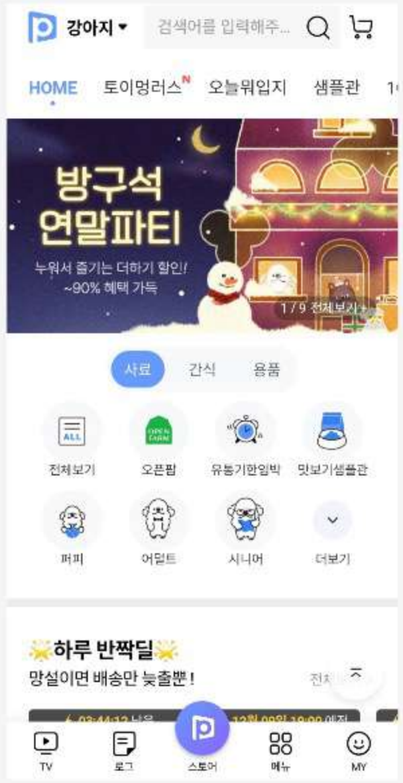
- 비만도 진단 서비스는 있으나

사용자가 직접 항목을 선택하게 하여

비만도 진단

- 기록 저장하지 않음

프로젝트 차별성 1 - 비만도 진단



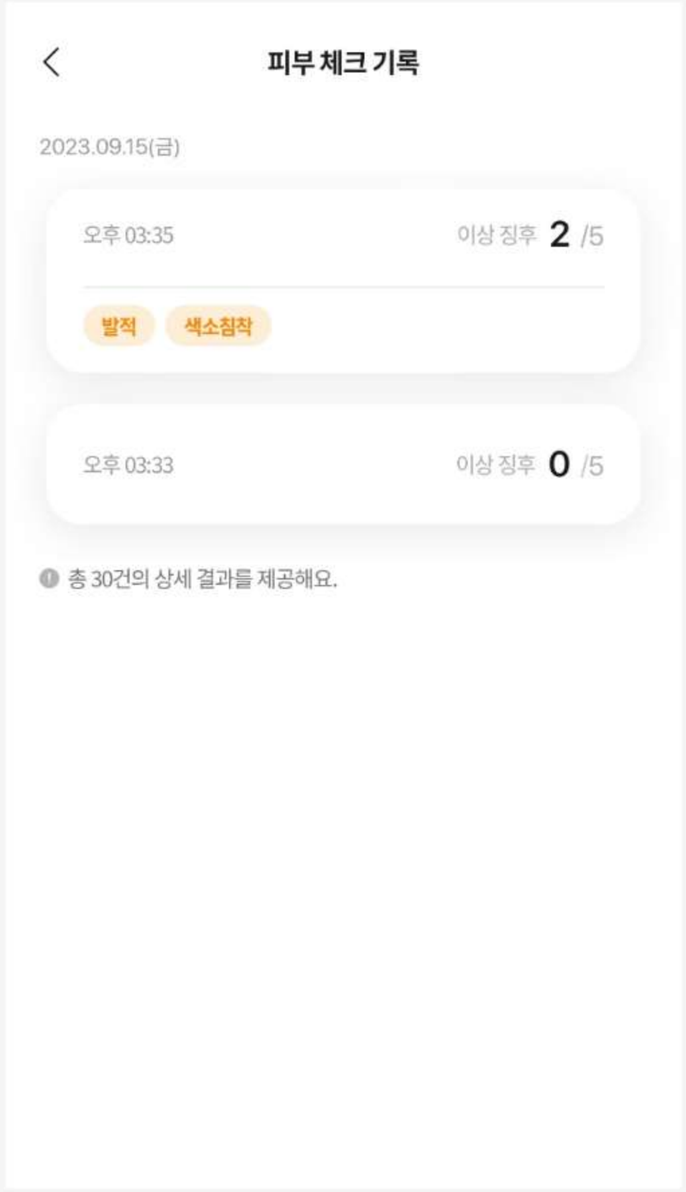
타 반려동물 관련 서비스:
티티케어/펫프렌즈/집사일기/어바웃펫

유사 서비스 없음

프로젝트 차별성 1: 비만도 진단

- 사진 촬영 후 AI를 활용한 비만도 진단
- AI 로그 기록을 제공해 사용자의 신뢰도 높임
- 이후 진단 기록 그래프로 나타내 변화 추이를 한 눈에 확인할 수 있도록 함

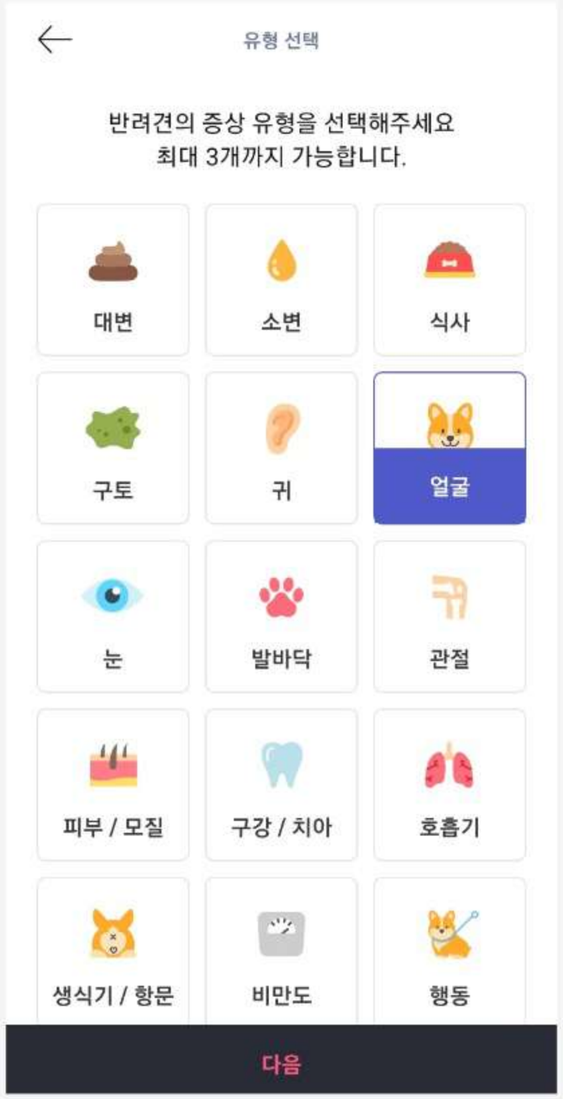
프로젝트 차별성 2 - 피부질환 기록



유사 서비스: 티티케어

- 이상 징후 개수와 이상징후 기록을 카드 형식으로만 제공

프로젝트 차별성 2 - 피부질환 기록



유사 서비스: 멍냥보감

- 피부질환 진단 서비스는 있으나 사용자가 직접 항목을 선택하게 하여 질환 진단

- 간단 측정이라는 이름으로 별다른 기록 저장하지 않음

프로젝트 차별성 2 - 피부질환 진단

타 반려동물 관련 서비스:
펫프렌즈/집사일기/어바웃펫

유사 서비스 없음

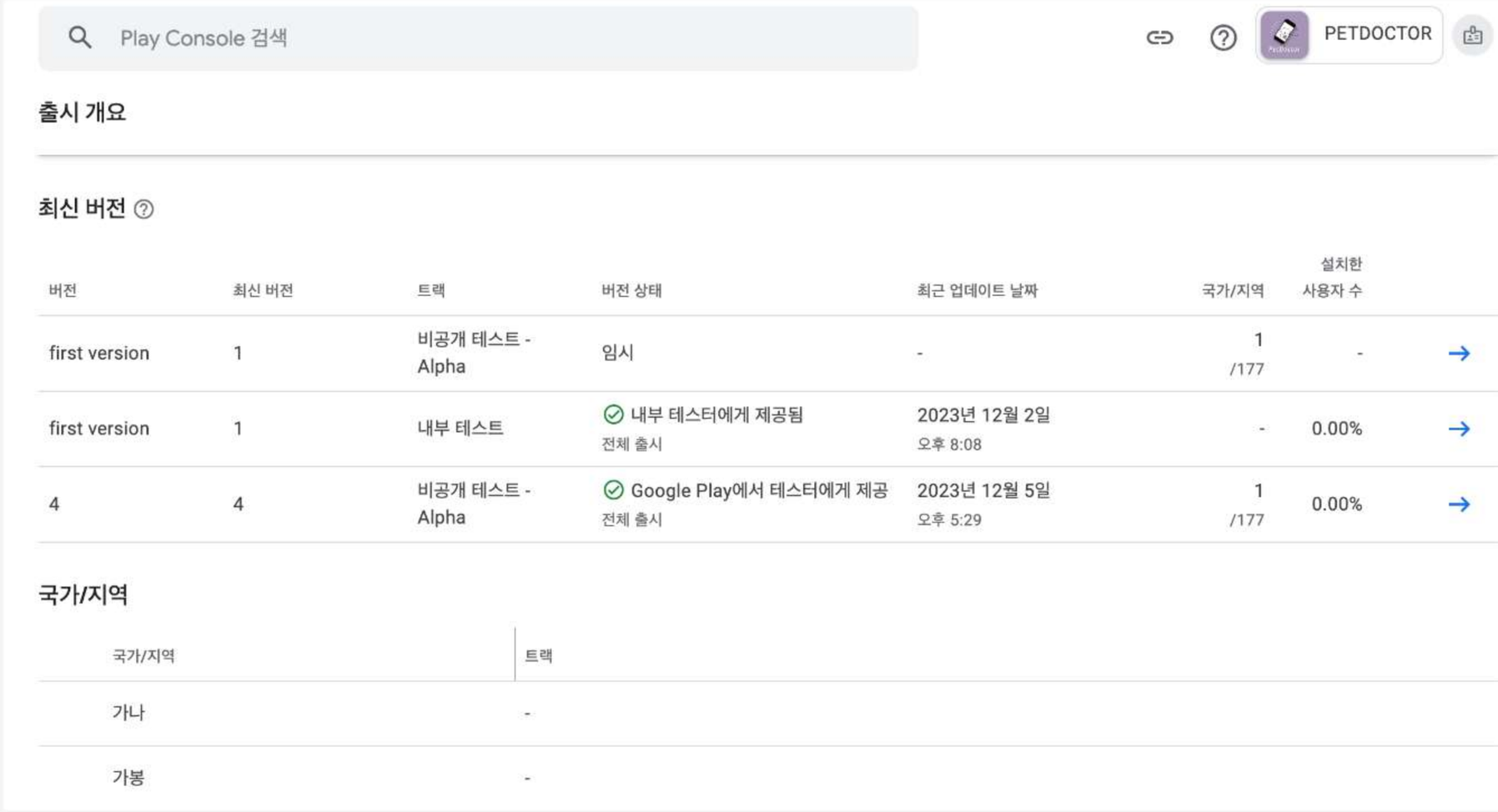
프로젝트 차별성 2: 피부진단 기록

- 명확하고 간결한 그래프로 기록 시각화
- 더 많은 정보를 원하는 사용자를 위해 추가 정보를 제공하는 사용자 중심 디자인
- 시각적 일관성 유지

추가적으로 고려한 사항

- UI/UX
- 자체 로그인 기능
- 기록 날짜별로 찾기 기능
- 플레이스토어 출시

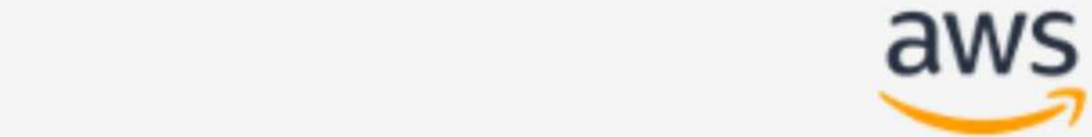
추가 고려 사항 - 플레이스토어 출시



내부 테스트 과정 전부 완료 -> 현재 알파 테스트 중

내부 테스트 과정 전부 완료 -> 현재 알파 테스트 중

기술스택



TEAM MEMBER 포지션 소개 / 협업

문벼리

디자인

프론트엔드

오용희

AI

정현서

백엔드

발표 내용에 관해
궁금한 점이 있으시다면
자유롭게 질문해주세요!

Q&A