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Cardiac Recognition and Abnormal Detection of Pet Heart Failure Using Dual-Stage YOLOv5

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Introduction

◆ Goals
  • Development of the abnormal and normal heart classification, presence or absence of heart failure
  • Early prediction system with object detection using chest radiographs for predicting heart failure in pets

◆ Motivation
  • Heart failure, one of the causes of pet death, is diagnosed by evaluation abnormal dilatation of the heart through chest radiographs
  • An experiment was conducted to diagnose this through a ML[*] model

[*] Machine learning

Causes of death in dogs in the province of Rome

Causes of unexpected death of dogs and cats
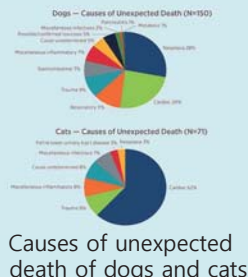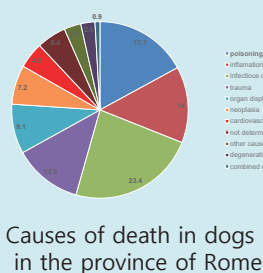
Dataset and Method

◆ Dataset Description
  • AIHub (반려동물 질병 진단을 위한 영상(흉부), 2021)
  • Training set(1,585)+Validation set(300)+Test set(60)

◆ Learning Framework

Stage- I : Cardiac recognition

Stage-Ⅱ : Abnormal detection

Experiment Results

◆ **Stage- I** : Cardiac recognition

Accuracy	95% (±1.5%)	
Input		annotation file(.txt)
Output		heart 0.85

◆ **Stage-Ⅱ** : Abnormal detection

Accuracy	82% (±3%)	
Input		annotation file(.txt)
Output		normal 0.85

Discussion and Conclusion

◆ Discussion and Conclusion
  • Cardiac recognition is possible through ML models that have learned chest radiography
  • Heart failure can also be distinguished to some extent by chest radiation learning
  • Since YOLOv5 has a limitation of not being able to connect two different learned model

◆ Future Work
  • Need for modifying the YOLOv5 model to consider species, gender, weight, and heart rate

References

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