

# Application of Artificial Intelligence on Detecting Canine Left Atrial Enlargement on Thoracic Radiographs

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## ABSTRACT

Researchers at the University of California, Davis have developed a deep learning-based diagnostic tool that accurately detects left atrial enlargement in canine thoracic radiographs to aid early diagnosis of mitral valve disease.

## FULL DESCRIPTION

This technology uses a convolutional neural network (CNN) implemented via the VGG deep learning framework and Keras to analyze lateral thoracic radiographs of dogs, detecting early signs of left atrial enlargement (LAE), a precursor to myxomatous mitral valve disease (MMVD). By training on radiographs paired with echocardiographic validation, the system achieves diagnostic accuracy comparable to board-certified veterinary radiologists, providing an affordable, fast, and objective screening tool suitable for general veterinary practitioners.

## APPLICATIONS

- ▶ Veterinary general practice diagnostic enhancement for early detection of heart disease in dogs.
- ▶ Veterinary diagnostic imaging centers seeking automated tools to improve throughput and accuracy.
- ▶ Telemedicine platforms integrating AI-assisted radiographic assessment for remote veterinary care.
- ▶ Development of veterinary AI software products focused on cardiology and thoracic imaging.
- ▶ Veterinary teaching hospitals and research institutes for training and validation of cardiac imaging techniques.

## FEATURES/BENEFITS

- ▶ Matches or exceeds expert veterinary radiologists in detecting left atrial enlargement (LAE) from thoracic radiographs.
- ▶ Delivers objective and consistent evaluations, minimizing inter-reader variability from manual interpretation.
- ▶ Increases affordability and accessibility by operating with standard thoracic radiographs, eliminating immediate need for specialist echocardiography.
- ▶ Enables fast preprocessing and analysis with minimal computational requirements on CPU or GPU platforms.

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## OTHER INFORMATION

### KEYWORDS

artificial intelligence,  
 canine cardiac disease,  
 convolutional neural  
 network, deep learning,  
 echocardiography, left  
 atrial enlargement,  
 machine learning, mitral  
 valve disease, thoracic  
 radiographs, veterinary  
 diagnostics

### CATEGORIZED AS

- ▶ **Agriculture & Animal Science**
  - ▶ Animal Science
- ▶ **Computer**
  - ▶ Other
  - ▶ Software
- ▶ **Imaging**
  - ▶ Medical
  - ▶ Software

- ▶ Enhances diagnostic performance through continuous retraining with expanding image datasets.
- ▶ Supports clinical decision-making and timely specialist referral with clear binary predictions.
- ▶ Eliminates subjective and inconsistent assessments of LAE caused by variability in canine breeds, positioning, and radiographic interpretation.
- ▶ Addresses limited access and high costs of echocardiography provided by veterinary cardiologists.
- ▶ Prevents delayed diagnosis and management of myxomatous mitral valve disease in dogs due to lack of accessible, reliable screening methods.
- ▶ Fills the gap of inadequate screening tools available to general veterinarians without specialized cardiac imaging training.

- ▶ **Veterinary**
  - ▶ Companion Animal
  - ▶ Diagnostics
  - ▶ Other

#### RELATED CASES

2019-439-2

#### PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	<a href="#">12068077</a>	08/20/2024	2019-439

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