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Applying a Machine Learning Algorithm to Canine Radiographs for Automated Detection of Left Atrial Enlargement

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ABSTRACT

Researchers at the University of California, Davis have developed a method of detecting canine left atrial enlargement as an early sign of mitral valve disease by applying machine learning techniques to thoracic radiograph images.

FULL DESCRIPTION

Heart disease is common in canines, with an estimated 10% of dogs in the U.S. developing heart disease during their lifetimes. Myxomatous mitral valve disease (MMVD), in particular, affects a majority of dogs with heart disease. The mitral valve controls flow between the left atrium and left ventricle. It may degenerate over time or be damaged by endocarditis. Left atrial enlargement is an important part of the diagnostic evaluation for dogs suspected of having MMVD or other heart conditions. Thoracic radiography is a widely-available and relatively inexpensive method used currently to diagnose left atrial enlargement. However, diagnostic assessment of left atrial enlargement is somewhat subjective and prone to error.

Researchers at the University of California, Davis have developed a method of detecting canine left atrial enlargement in right lateral radiographs by applying a machine learning framework. A convolutional neural network (CNN) - a commonly-used neural network algorithm often applied to analyzing visual imagery - uses multiple processing layers and a self-improving method called backpropagation to analyze the radiographs and detect abnormal left atrial size. Researchers have achieved accuracy, sensitivity, and specificity comparable to veterinary radiologists during the testing of this algorithm. Because of the algorithmic nature of the neural network, this method will remove subjectivity from diagnoses and reduce the potential of human error.

APPLICATIONS

- ▶ Improved veterinary imaging diagnosis method for canine mitral valve disease

FEATURES/BENEFITS

- ▶ Veterinarian needs only to perform conventional thoracic radiographic examination
- ▶ Lower cost and faster turn-around time on diagnoses
- ▶ Accuracy comparable to veterinary radiologist
- ▶ Consistent - and minimizes the likelihood of human error

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20220351854	11/03/2022	2019-439

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OTHER INFORMATION

KEYWORDS

Neural network, Heart disease, Canine, Mitral valve, Radiography, Artificial intelligence, Machine Learning, Atria

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