

**CLAIMS**

1. A system (100; 200) for providing a parameter of a human heart, the system comprising:

a first trained neural network (104; 204) having an input and an output, the first neural network arranged to receive a plurality of echocardiographic images and to classify the echocardiographic images into one of at least two different views comprising at least a two-chamber view and a four-chamber view; and

a second trained neural network (112; 224) having an input and an output, the second neural network arranged to receive images from at least one of the two-chamber view or the four-chamber view and to identify the endocardial border of the left ventricle for each view;

a first responder (118, 120; 230, 232) which is responsive to the outputs of the second neural network to identify end-systole and end-diastole images; and

a second responder (126; 238, 240, 246) which is responsive to the end-systole and end-diastole images to derive a parameter of the heart.

2. A system as claimed in claim 1, further comprising a third responder (210, 212) for identifying suitable echocardiographic images to provide to the second neural network based on at least one characteristic of the echocardiographic images.

3. A system as claimed in claim 1 or claim 2, wherein the second responder (126; 246) is arranged to combine the two-chamber and four-chamber endocardial borders of the left ventricle to derive volume-based parameters.

4. A system as claimed in any one of the claims 1 to 3, wherein the parameter is ejection fraction.

5. A system as claimed in any one of the claims 1 to 3, wherein the parameter is Global Longitudinal Strain.

6. A system as claimed in claim 1 or claim 2, wherein the parameter is regional strain.

7. A system as claimed in claim 6, wherein the regional strain parameter comprises six regions.

8. A system as claimed in any of claims 1 to 7, wherein the plurality of echocardiographic images comprise a plurality of non-contrast images.

9. A system as claimed in any preceding claim, wherein the plurality of  
5 echocardiographic images comprise a plurality of contrast echocardiographic images.

10. A method of training a system as claimed in any one of the claims 1 to 8, wherein the neural networks are trained on non-contrast data.

10 11. A method of training a system as claimed in any one of claims 1 to 7 or claim 9, wherein the neural networks are trained on contrast data.

12. A method of diagnosing a pathology of a heart comprising:  
receiving a plurality of echocardiographic images from a subject;  
15 using the system according to any one of claims 1 to 9 to analyse the plurality of echocardiographic images to derive a parameter of the heart;  
comparing the parameter of the heart to at least one predetermined threshold parameter; and  
detecting a difference between the parameter of the heart and the at least one  
20 predetermined threshold parameter, said difference being indicative of a pathology of the heart.

13. A method of treating a pathology of a heart comprising:  
receiving a plurality of echocardiographic images from a subject, using the system  
25 according to any one of claims 1 to 9 to analyse the plurality of echocardiographic images to derive a parameter of the heart;  
comparing the parameter to at least one threshold parameter;  
detecting a difference between the parameter of the heart and the at least one  
predetermined threshold parameter, said difference being indicative of a pathology of the  
30 heart, and  
administering a therapeutically effective amount of a drug to the subject, the drug alleviating one or more symptoms of the pathology of the heart.