

## Claims

1. A system for diagnosing a heart condition comprising an imaging system  
5 arranged to acquire two images of the heart at respective points in the cardiac cycle, locating means for locating a series of pairs of points on the images, each pair of points indicating the respective positions of a single part of the heart in the two images, processing means arranged to calculate from the positions of said pairs of points a value of at least one parameter of the deformation of the heart, and to compare  
10 the value of the at least one parameter with reference data to generate a diagnostic output, wherein the at least one parameter includes the sum of displacements in the longitudinal and radial directions for at least one of said parts of the heart.
2. A system for measuring deformation of a heart, the system comprising an imaging system arranged to acquire two images of the heart at respective points in the  
15 cardiac cycle, locating means for locating a series of pairs of points on the images, each pair of points indicating the respective positions of a single part of the heart in the two images, processing means arranged to calculate from the positions of said pairs of points a value of at least one parameter of the deformation of the heart, wherein the at least one parameter includes the sum of displacements in the  
20 longitudinal and radial directions for at least one of said parts of the heart.
3. A system according to claim 1 or 2 wherein the at least one parameter comprises principal transformation.
4. A system according to any one of claims 1 to 3 wherein the at least one parameter comprises shear transformation.
- 25 5. A system according to any one of claims 1 to 4 wherein the at least one parameter includes a displacement in at least one direction.
6. A system according to claim 5 wherein the displacement is a mean of the displacements for all of said parts of the heart in at least one direction.

7. A system according to any preceding claim wherein the locating means comprises a user input device arranged to enable a user to locate said pairs of points and to record the positions of said pairs of points.

8. A system according to any preceding claim wherein the imaging system is arranged to store the images as respective image data sets, and the locating means is arranged to process the image data sets to determine the locations of said pairs of points and to record the positions of said pairs of points.

9. A system according to any preceding claim wherein the at least one parameter comprises a plurality of parameters and the processing means is arranged to compare the value of each of the parameters with a respective reference value.

10. A system according to claim 9 wherein the processing means is arranged to use machine learning to define a decision tree for generating the diagnostic output from the values of the parameters.

11. A method of producing a system according to any preceding claim, the method including analysing a set of images, wherein each of the images has a diagnostic outcome associated with it, the method including calculating a value of the at least one parameter for each of the images, analysing the values and the diagnostic outcomes to determine a relationship or correlation between the two, further comprising using machine learning to develop a decision tree for generating the diagnostic output from the values of the parameters.

12. A method of measuring deformation of a heart, the method comprising acquiring two images of the heart at respective points in the cardiac cycle, locating a series of pairs of points on the images, each pair of points indicating the respective positions of a single part of the heart in the two images, calculating from the positions of said pairs of points at least one parameter of deformation of the heart, wherein the at least one parameter includes the sum of displacements in the longitudinal and radial directions for at least one of said parts of the heart.

13. A method according to claim 12 wherein the at least one parameter comprises principal transformation.

14. A method according to claim 12 or claim 13 wherein the at least one parameter comprises shear transformation.
15. A method according to any one of claims 12 to 14 wherein the at least one parameter includes a displacement in at least one direction.
- 5 16. A method according to claim 15 wherein the displacement is a mean of the displacements for all of said parts of the heart in at least one direction.
17. A method according to any one of claims 12 to 16 further comprising processing the image data sets to determine the locations of said pairs of points and recording the positions of said pairs of points.
- 10 18. A method according to any one of claims 12 to 17 wherein the at least one parameter comprises a plurality of parameters and the processing means is arranged to compare the value of each of the parameters with a respective reference value.
- 15 19. A method according to any one of claims 12 to 18 further comprising using machine learning to define a decision tree for generating a diagnostic output from the values of the parameters.