Assignment Two (A2):
Paper Summary (Individual)
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Objective

To try finding a faster way of diagnosing a coronary heart disease through glyph visualization. Representing glyph in a 3D - 2D format of a multivariate data and integrating a counter finding algorithm, glyph-based approach, into normal workflow that helps in visualisation of Heart failure diseases like wall thickening.

Difference to Literature

Variety of work has been done to visualise coronary artery disease some of them have used non-invasive imaging techniques that includes MRI, SPECT, PET, etc. Most of them includes sectioning and slicing of images dividing them based on distance, shape, colour, and position. One of the methods used was fiber-tracking algorithm. During research limitation of glyph was found that only 2 functional parameters can be used.

Many factors are needed to be considered while using glyph visualizations for example placing the number of glyphs determine the amount of information, what data to be picked, and which combination of data is the best for finding.

Workflow/Experiment and Description of Support

The typical workflow includes data acquisition and data analysis in the former first injection of drug into the vessel is done following the process of consumption by cell waiting for a short period of time and then scanning again repeating the above through two headed Gamma cameras and then reconstruction as well. In analysing the data several protocols are followed by the physician which includes like analysing attenuation-corrected static images, regional defects, deciding whether defects are resolved, finding fixed defects by looking wall thickness, inspect heart size in cardiac diseases without perfusion defects

We use glyph into formats first is mean by in which myocardium is represented in 3D surface and glyphs are added to add further parameters in second to inspect blood supply in a 2D slicing view with which physicians are familiar with. There are various ways in which glyph can be represented some of them are 1.) 2 phase information processing- in which We display the most important parameter through which position get a good idea and further a detailed view based on size and opacity the former is based on shape colour texture position end distance. 2.) according to glyph characteristics- buy mapping different glyph properties and variable and how many simultaneously it is important to note with few properties it is easy to understand the more it is it gets difficult. Then there are Glyph mapping and glyph placing which yields too many glyphs context had to be minimised. 4.) Tooltips 5.) Design of the Glyph Visualizations – This is one of the most important as it is fast and efficient and reliable as easy to interpret as well. We derived Semi Transparency one the best way to represent glyph visualisation based on color as thick and thin, size as intensity etc.

For evaluation case study was done based on semi-transparency glyph as it has features of size and was defined to retain visibility. In clinical cases 4 different types of case study was created 1.) Normal Myocardial Perfusion - referred for myocardial perfusion imaging – with interpretation of myocardial perfusion as normal. 2.) similarly Case 2: Stress-Induced Ischemia, 3.) Scar and Stress-Induced Ischemia, 4.) Heart Failure with interpretation as insufficient blood flow and no myocardial scarring - Extended transmural scarring - heart failure respectively. In conclusion we got the glyph-based approach was 10% much faster than traditional slice-based approach.

Future work

It can be synchronised according to physician request, can have animation and representing in a more detailed format after entering in any particular part of the glyph, can also show suggestions of different representations.

References:

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