Consensus Segmentation of Cardiac Images for Automated Methods

Terms of Data Usage and Participation Agreement

Version 1.0.1

Introduction

The Consensus Segmentation of Cardiac Images for Automated Methods (CONSENSUS-AUTO) project is a collaborative work initiated by the Cardiac Atlas Project (CAP) to establish a resource for common data set and ground truth images of the heart. The resource is open for contributions and participations. This document sets out the policies and procedures governing the participation and the distribution of the data used in this project. The primary purposes of this document are to assure protection of patient data privacy, responsibility of the data handling, acknowledgement of the Contributing Study, and appropriate allocation of rights to inventions, information or intellectual property arising from use of the data.

Definitions

Cardiac Atlas Project or **CAP**: a world-wide project to establish a standardized database cardiac imaging examinations together with derived analyses, for the purpose of statistical characterization of global and regional heart functional abnormalities to the research communities. The CAP was funded by the National Heart, Lung and Blood Institute, USA (R01HL087773), part of the National Institutes of Health.

Data Contributor: institutions, clinicians or physicians who have collected cardiac imaging data and derived results, and contributed de-identified data to the CAP. The Data Contributor for this CONSENSUS-AUTO project is Daniel C. Lee from the Division of Cardiology, Northwestern University, USA. The Data Contributor maintains ownership over the Contributing Study in the CAP, and controls the use of the data through the CAP-DETERMINE Data Distribution Agreement. Terms and conditions are required for access to the data, and are imposed by the nature of the informed consent and Institution Review Board (IRB) approval under which the data were acquired.

Contributing Study: CMRI data and derived results provided for this project, which consists of short axis and long axis cine MRI data from 200 patients selected from the DETERMINE cohort.

DETERMINE: a multicenter, randomized study of patients with coronary artery disease and mild to moderate left ventricular impairment, collected to identify those who may be at risk for developing abnormal heart rhythms that might result in sudden cardiac death. Two hundred cases from the DETERMINE cohort is selected randomly as the Contributing Study in this project.

Participant: a researcher or a research group who participates in this project.

Rater: a semi- or fully-automated algorithm contributed to segment myocardium in this project.

Test Set: a collection of 100 randomly selected cases from the Contributing Study. The Test Set is disjoint from the Validation Set.

Validation Set: a collection of 100 randomly selected cases from the Contributing Study. The Validation Set is disjoint from the Test Set.

Segmentation Image: an image with pre-defined labels, for instances myocardial pixels (value=1) or non-myocardial pixels (value=0).

Consensus Image or **Consensus**: a segmentation image where each pixel was estimated by using an algorithm to reach agreement from Segmentation Images contributed by all Raters.

Participation procedures

Participation can be initiated through direct contacts with the CAP personnel. Upon agreeing to this agreement document, a new Participant may proceed, in the following order, to:

1. Download the Test Set and Validation Set from the CAP website.
2. Perform segmentation on the data set.
3. Submit the segmentation results from the Validation Set.
4. Retrieve the validation results based on the current Consensus Images.

Details about the contents of data set, the segmentation image format, how to prepare submission and the validation format are given in the CAP website. A new Consensus Images will be estimated based on the results from the new Rater.

Data distribution policies

1. The CAP-DETERMINE Data Distribution Agreement applies.
2. Participants can **only** use the Contributing Study for segmentation purposes. **Any use of the data beyond the scope of segmentation requires a separate request.**

Organiser rights

1. CAP as organiser of this project has a right to use any Rater segmentation images that have been submitted to this project to be included to update the current consensus image estimation.
2. CAP has the right to retain the consensus images in order to maintain the integrity of the ground truth consensus for the research community. This means that any new Participant or Rater can only ask for validation at anytime for the purpose of benchmarking or the development of their algorithm by submitting their segmentation results.

Participant rights

1. Participants may use the validation data set to develop, to test or to train their segmentation method.
2. Participants retain the ownership of their automated segmentation method and its results.
3. Participants may use the validation results for their publication by citing the following references:
   a. For patient data study:

A. H. Kadish, D. Bello, J. P. Finn, R. O. Bonow, A. Schaechter, H. Subacius, C. Albert, J. P. Daubert, C. G. Fonseca, and J. J. Goldberger. Rationale and Design for the Defibrillators to Reduce Risk by Magnetic Resonance Imaging Evaluation (DETERMINE) Trial. J Cardiovasc Electrophysiol, 20(9):982–7, 2009.

   b. For the validation results, which means also the consensus images:

A. Suinesiaputra, B. R. Cowan, A. O. Al-Agamy, M. A. Elattar, N. Ayache, A. S. Fahmy, A. M. Khalifa, P. Medrano-Gracia, M.-P. Jolly, A. H. Kadish, D. C. Lee, J. Margeta, S. K. Warfield, and A. A. Young. A collaborative resource to build consensus for automated left ventricular segmentation of cardiac MR images. Medical Image Analysis, 18(1):50–62, 2014.

4. Should a participant wish to withdraw their participation in this project, he/she can request the removal of their segmentation images from the project. However, all derived results from their segmentation images, such as the consensus images, comparison and validations, cannot be revoked.