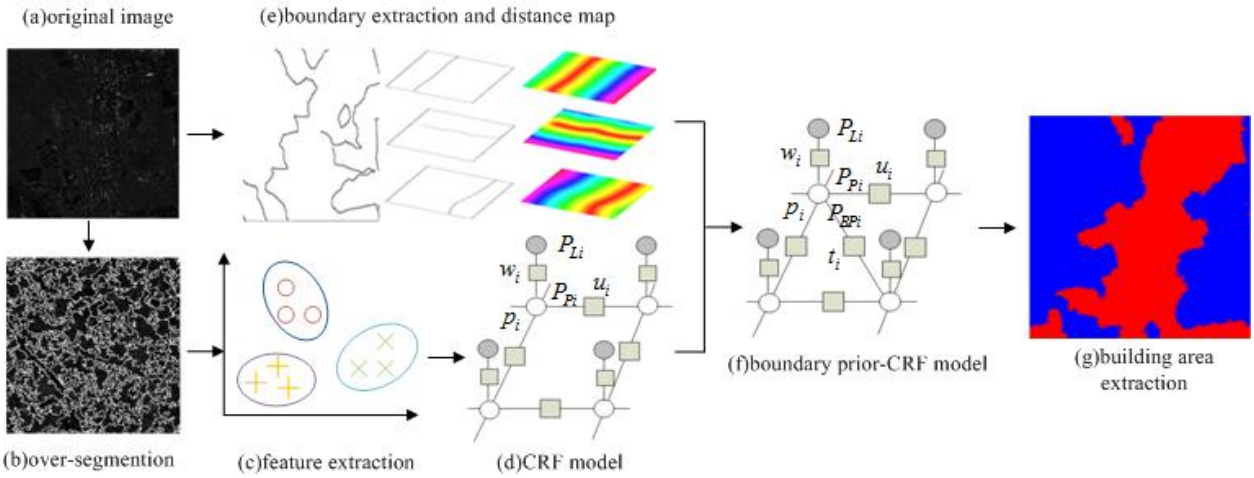
Design Document

Paper Reference: **BUILDING AREA EXTRACTION BASED ON BOUNDARY PRIOR AND CONDITIONAL RANDOM FIELD FOR SAR IMAGE** by *Chu He, Bo Shi, Yu Zhang, Xin Su, Wen Yang, Xin Xu.*

So, the cited paper discusses an algorithm for building area extraction on SAR image is discussed, which is based on conditional random model with an additional boundary prior relation to strengthen the description of prior item around the edge of area. Firstly, pre-segmentation and boundary lines extraction can be accomplished respectively rely on mean shift algorithm and ratio of average edge detection. After that a combination term of the distances between the boundary lines and pixels around them and the pixels' label information can help to improve the prior item in CRF and build the boundary prior-CRF model.

Flow Chart:



The above flow chart methodology was stated in the research paper and we followed it exactly as it is.

- RoA.py detects the boundary lines of the image using the masks as mentioned.
- calc_dist.py calculates the distances and collects the first N minimum distances in the form of a distance map.

- seg.py performs over segmentation of the test images.
- crf.py contains the model of a conditional random field. This file acts as a module and is used in other files like train_crf.py, test_crf.py and pbp.py.
- train_crf.py makes and trains the model “building_area.crfsuite” using the pre-built module crf.py
- pbp.py uses the model “building_area.crfsuite” and the results from the train_crf.py to enhance the CRF model into a boundary prior CRF model.

The final results of the image are stored in fin_results folder.

Various packages have been used in making this implementation. Some of the important ones are :

- **cv2,** which is the python implementation of OpenCV.
- **pickle** for making the temporary dat files for storing features (feature extraction).
- **pymeanshift** for the segmentation of the image using mean shift algorithm.
- **pycrfsuite** for the CRF model