Meeting's report for ELLEN WANG

Honour's student

15-12-2021

1. Meeting Agenda

- This meeting was with Audrey, meeting minutes are with Audrey.

2. Meeting Minutes from last week.

- ALL OF THE BELOW MAINLY SPENT DISSECTING THE RESEARCH ARTICLE:
- This article could be a good start, note that it's not segmentation. The authors are very good with random forest imaging.
- It's about having a big image, but you split the image into smaller images.
- In deep learning you call this a patch where each smaller image is an observation. For your image with 100 by 100 voxels, each smaller image would have 10 by 10 pixel samples. Build random forests so that each time you split your input space into two or more different regions.
- These decision rules are based on features and input variables.
- MAIN IDEA: you have your image where you randomly sample a number of regions, the size and a summary. Further sample this region with an operator.
- Note that distance in the random forest is a feature. You can use Euclidean or other different equations.
- This literature is about PolSAR images specifically, and uses Geodesic distances to measure the distance of the earth.
- SECTION THREE is the most important part.
- What's new in this article? Tree creation and training. Really understand under section 15, how do you split the node? Make a selection based on the impurity metric.
- The novelty here is the node testing of the tree. They implicity keep the spatial structure of the image. Sample as a patch of the polar image. Note that w is the patch, k is the channel. Keep splitting this patch into smaller regions so that there are different centres of the pixel colour values.
- Each voxel in the MRI is its intensity, compute this for each region. Imagine you have four regions which make up 4 means. At the end you only have one value because the roots are the regions you are splitting the tree in.
- If you pick individual voxels you will loe the spatial structure. Each observation will be a voxel. Treat individually each voxel, but two voxels close by will be the same if we split it by individual pixels. Work on small regions!
- Therefore we instead treat observations as a smaller image of your image.
- Let Audrey know if any questions and refer to the article specifically.
- Understand the article and tie it into deep learning. Try to apply it to segmentation.
- If your random forest works, don't need to change a lot of stuff to apply to the algorithm, just need to propose mean, median so it becomes really easy.
- Will have to dealw ith really big sample so work on one image first.
- Each patch will have 10 by 10 for 100 pixels, and each patch has a numerical value. Each value is a pixel value?
- Each image has an operator, then you compute the mean so you have one value.

- Because you are computing the mean for a small patch, then splitting the patch up into smaller values, therefore will need a correlation operator which calculates teh difference in patches, where inside the patch there are big differences, then analyse the difference in the random forests.
- It's really jsut random forests applied to the image, see how we can transform this algorithm into segmentation algorithm (next step), segmentation in deep learning and random forests.
- Focus on this article for now.

4. Planned work after this meeting

- Send KNN algorithms to Audrey.
- Feburary more free for Audrey to work with me.
- Make powerpoint: 1st slide: how they split the image, 2nd slide: just the algorithm and number of tres, 3rd image: if you need to explain a bit more.
- Look at Jiyang's images for deep learning.