Chapter 1 Revisions (2017-09-12+) from Dr. Khademi

Legend:

* Dr. Khademi comments
* Quotes from the pre-revision paper
* Jesse comments
* Quotes from the post-revision paper
* **Jesse comments: requesting additional feedback**
* can you remind me the difference of your technique and LPA?  And also between the work that used logistic regression (the one we reviewed that was published recently – I believe they use multi-modality).  You should also make it clear what the related works have done – i.e. the previous works that are related to your method and how yours are different.
  + I didn’t think the intro would be the appropriate place to do this, since the model has not yet been introduced. **I mention LPA instead in the Methods section** (2.2 Voxel-Wise Logistic Regression). In the original version you’re working on now, I don’t go into much detail even there though. I will update this with other revisions to the Methods section all at once, including both LPA and the work by Sweeney (“OASIS”, the other logistic regression model).
* Overall good
* “Overlapping distributions:”
  + see discussion from your journal paper I think you can combine the PVA section and noise section here.
    - Done. Updated these combined to:
    - The intensity of image voxels alone is not sufficient to determine their class; This is on account of two factors. First, the magnitude of magnetization sensed during image acquisition is extremely small. As a result, quasi-Gaussian additive noise from several sources corrupts image intensities throughout the image [X]. Second, with finite image resolution, voxels located on tissue boundaries will inevitably contain tissues of two or more tissues. This is known as partial volume effect (PVE), and the resulting signal intensity can be modelled as a linear mixture of the components [X,X]. Niessen et al. [X] show that inadequate modelling of PVE can result in significant errors in tissue segmentation, though the widely reported 30\% figure from this work is derived from unrealistic conditions.
  + Also you state” Niessen et al. [72] show that inadequate modelling of PVE can result in significant errors in tissue segmentation, though the widely reported 30% figure from this work is derived from unrealistic conditions.
  + Do you have a reference for this.  There are several papers that discuss this
    - Most papers I could find cited the Niessen paper (pp 192). Quoting from it:
    - “*Binary segmentations are obtained by setting a voxel to a certain tissue type if more than half of the voxel contains this tissue. […] The errors in the estimated volume are in the range of 0–4%. […]”*
    - Later in the paper:
    - *“To relate the error in a segmentation to the average distance of the segmented contour to the true contour, we looked at the volume increase (decrease) when performing a two-dimensional dilation (erosion) in all slices with a ‘+’ as structuring element. […] This volumetric error is equal to approximately 30% for white matter, approximately 40% for grey matter and approximately 60% for CSF.*”
    - The first conditions seem reasonable to me, since the total volume balances out as some voxels round up and some round down. By contrast, dilation/erosion of binary class images at every possible boundary is, in my opinion, unrealistic, even if only by one voxel.
    - Another work suggesting figures on this order (20-60%) is [Tohka 2004](http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=44C99529127862D2EEF9613A79EA7FFE?doi=10.1.1.357.8606&rep=rep1&type=pdf), who derives these numbers from [Ballester 1999](https://www.researchgate.net/profile/Miguel_Angel_Gonzalez_Ballester/publication/12184574_Segmentation_and_Measurement_of_Brain_Structures_in_MRI_Including_Confidence_Bounds/links/0912f5072897e111ad000000.pdf). However, in this work, surfaces are fitted to the segmentation boundaries in order to compute the volume estimates. This is not a common technique, and I don’t think these values are transferrable. Actually, Ballester also compares a voxel-wise thresholding technique, but the thresholds are not given: “*For the results reported for the voxel-based thresholding tool, upper and lower estimates for the segmentation are obtained by setting two different thresholds*.” I searcher the paper and could not find these values. You could choose 0.01 or 0.99 and get very different results!
* There is a undefined reference …. Table 3.2 for typical values and ?? for modelling)
  + Fixed (actually, removed).
* I think using content from your thesis in your journal is okay – although verbatim copy is usually forbidden by journals.  You should verify with the journal
  + Okay, re-worded this part then. The new version is shorter, so I might put the new version in the paper.
* Please discuss my work as relayed to you in the previous email. In works by Khademi et al., a peak in the conditional probability of edge content on graylevel is used to model partial volume averaging for unsupervised WML segmentation in FLAIR MRI for subjects with ischemic and MS diseases [57, 76, 70].
  + Done
* External tool boxes – you do not discuss LPA or the relationship of your work to LPA.
  + See comments on relationship of VLR to other methods, above. Also, in this “External Toolboxes” section, I was focusing only on toolboxes which do general neuro-image processing – i.e. not WML segmentation.