Question

* What is "Read Protocol" stage doing exactly?

When looking on the list of stages (list box), "Do\_All\_Actions\_Callback" does not check this stage…

**Answer –**

**Read protocol is happening anyway.**

**It just reads the relevant data (images).**

* Ask him to try and explain again the spiral spin movement that is described in Woflram.

**Answer-**

**Can look on it from the proton point of view which rotates in the Z plan around a X-Y magnetic field.**

* Gilad uses Reshape4d22d.m a few times. Ask him to explain the function...

**Answer-**

**I commented it with explanations. In general it takes the 4D and reshape it to one column with N time frames columns.**

* When opening .nifti files with mricron, must I set the dynamic range manually? I encountered some times when the min-max range, which I assume is taken automatically, is not giving a good map.

**Answer-**

**Looks like it is not min-max, but heuristic method.**

**Gilad thinks that the heuristic is problematic with NAN and Infinity.**

**Gilad wrote his own heuristic method (new – take it from Gilad).**

**MainGUI.m:**

* MainGUI.m, Line 219, what is the purpose of DoGlobal and DoDeviations?

**Answer –**

**DoDeviations – Correction for flip angles (exp. – machine says its 20 degrees while the real one is 20.2). Implemented under CalcRelaxForVolNFA.m. Currently not used.**

**DoGlobal – N3 fixes B1 non-uniformity by a factor for each voxel. Gilad picks a point in white matter to be the reference point (implemented in DCET1\_RelaxForSubjectf.m).**

* MainGUI.m, Line 510, does not work when using "Force Read Protocol"

**Answer –**

**I think I fixed it when changing the misspelled word under DCEInit.m from "ShortIsnfos" to "ShortInfos".**

* MainGUI.m, Line 69, when checking if LastMainGUI.mat exists, it might take bad dest folder when changing computers. Is it OK to comment it?

**Answer –**

Probably fixed it.

**DCET1\_Prepare4Df.m:**

* DCET1\_Prepare4Df.m , Line 13, TimeBetweenDCEVolsPerSlice.

**Answer –**

**The time between is slice is dependent on the resolution, repetition time and acceleration ingredients.**

* DCET1\_Prepare4Df.m , Line 53, Min\* parameters.

**Answer –**

**Min singal from each the data is relevant.**

**Min enhancment for mask usage (less than that is not interesting)**

* DCET1\_Prepare4Df.m , Line 78, Clean not needed?

**Answer –**

**He does not remember.**

* DCET1\_Prepare4Df.m , Line 84, Ask Gilad to explain the coregistration.

**Answer –**

**SPM does it.**

* DCET1\_Prepare4Df.m , Line 111, Ask Gilad regarding Mutual Information calculation.

**Answer –**

**I will learn that in Information Theory. SPM uses it (either that or correlation) to co-register the images. Gilad uses it to check how well the co-registration was.**

**He checks it by calculating MI for each volume to the mean volume (after co-registration).**

**He then gets a curve.**

**If we go over all subjects and compare their MI curves, we can deduct the values for a good/bad co-registration.**

* DCET1\_Prepare4Df.m , Line 122, Ask Gilad why did he divide the maximum of the dynamic range by 3?

**Answer –**

**Looks better when dividing by 3 (trial and error).**

* DCET1\_Prepare4Df.m , Line 245, Ask Gilad why did he add +1?

**Answer –**

**Ttest (+Otsu) divides to group A (1-x) and B (x+1 – n). So we want x+1.**

**DCET1\_RelaxForSubjectf.m:**

* DCET1\_RelaxForSubjectf, Line 91, what is the purpose of the condition?

**Answer –**

**Implementation of DoGlobal. He added an option to pick the white matter manually.**

* DCET1\_RelaxForSubjectf, Line 179, what is the purpose of the following paragraph?

Currently the GUI does not define that parameter.

**Answer –**

**Implementation of DoDeviations (described above).**

**CalcT1byFAfw2.m:**

* CalcT1byFAfw2, Line 6, why did he pick those initial values?

**Answer** –

**Just reasonable parameters to work with.**

* CalcT1byFAfw2, Line 41, how did he calculate T1?

**Answer** –

**SHOULD READ THIS IN GILAD's ARTICLE.**

* CalcT1byFAfw2, Line 64, what are PDs, is it Proton Density and it is proportional to M0?

**Answer** –

**We use this as M0.**

**DCET1\_CTCf.m:**

* DCET1\_CTCf, Line 27, didn't he run the b1 cleaning in DCET1\_RelaxForSubjectf already?

**Answer** –

**He used it just to get the file name (T1Res{1,1,2})**.

**If it was already calculated, it won't be calculated again(using "false" option)**.

* DCET1\_CTCf, Line 44, what is the purpose of the following?

**Answer** –

**This is the B1 calculation**. **The usage of sqrt() is according to the article. SHOULD READ THE ARTICLE AND CHECK THAT.**

* DCET1\_CTCf, Line 57, how did he determine those values?

**Answer** –

**He uses those values to see if the T1 calculation failed. He checks whether 1000 voxels or more has a value greater than T1 = 4000.**

**He used T1=1200 before for the iterations for calculating the REAL T1\_base to converge. T1=40,000 before was just a really high limit (so we won't realty limit the possible results).**

* DCET1\_CTCf, Line 85, I don't understand the B1 calculations…

**Answer** –

**SHOULD READ THE ARTICLE AND CHECK THAT.**

* DCET1\_CTCf, Line 103, how does he calculate FA and what is the purpose of the term CT1\*0?

**Answer** –

**He used the CT1\*0 just to use the matrix dimensions of CT1**.

**He multiplied by B1 to take into consideration the fact the angle is not uniform** **(because of B1).**

* DCET1\_CTCf, Line 130, what is the purpose of the following 2 lines?

**Answer** –

**He wanted to take a little bigger mask than the calculated one**.

* DCET1\_CTCf, Line 138, what is this mask exactly and why did he use "imag"?

**Answer** –

**Matlab gives an imaginary number for certain calculations (such as log(-5)).**

**This is non-physiological.**

**He takes a mask not including and NANs and Imaginary numbers during the entire time of the test ( any("",2) …).**

* DCET1\_CTCf, Line 150, ask him to explain all the masks till the AIF\_Parker section?

**Answer** –

**Same mask as before (NANs and imaginary) + checks baseline bigger than 10 (noise below it – like the hollow rooms).**

* DCET1\_CTCf, Line 183, what are the following values and how did he determine it? (they are a bit different than what I see in the article)

**Answer** –

**He does not remember**. **Maybe he took it from a similar article.**

* DCET1\_CTCf, Line 194, why isn’t he interpolating C(t)?

**Answer** –

**He is interpolating it, but later on (AIF finding + PK extraction).**

**DCET1\_PKf.m:**

* DCET1\_PKf, Line 78, is Sdt supposed to be the time resolution? time intervals between -10 to +10 minutes?

**Answer** –

**Yes.**

* DCET1\_PKf, Line 87, why did he choose ">-1" as the interesting time? what is the meaning of negative time? The ability to shift the curve?

**Answer** –

**He doesn’t really use it.**

* DCET1\_PKf, Line 97, what are those deltas? Our T1 and T2 against population average?

**Answer** –

**He is not sure if he used these specific variables exactly.**

**The T2-T1 is a better way to look on the second bolus than using absolute values.**

**The tau is for the sigmoid (which he doesn’t really use), "-T1" for a relative value and not absolute.**

* DCET1\_PKf, Line 104, why did he assign T1=1?

**Answer** –

**T1 is the bolus start. He probably assumed it will be after a minute + he modifies it later.**

* DCET1\_PKf, Line 112, ask him - how did he determine those parameters? All of them, until line 120...

**Answer** –

**Reasonable limits (lower bound, upper bound and start point).**

* DCET1\_PKf, Line 148, what "options" are these and what is the meaning of the following?

**Answer** –

**He changed it in the newer version, so he doesn’t use it anymore.**

* DCET1\_PKf, Line 172, what "Auto points" does he mean and why does he need the max of each pixel around the bolus temproal volumes and at the end?

**Answer** –

**Each voxel has a c(t). The interesting characteristics of each voxel are the c(t) at bolus arrival and c(t) at the end of test (to know if we have enhancement).**

**He used those values to cluster all the voxels so eventually he could work on some representatives.**

* DCET1\_PKf, Line 183, what was he trying to do in the following lines?

**Answer** –

**He tried to cluster the values around the bolus and at the end of test according to 5 bins.**

* DCET1\_PKf, Line 205, what is the meaning of the following clustering?

**Answer** –

**He gave a global clustering (both for bolus time and end time). So if one point has index (2,3), it is actually 2\*5 + 3.**

* DCET1\_PKf, Line 264, RCTCE is already normalized to values between 0->1. Why is he normalizing again?

**Answer** –

**Seems like it is not normalized before. So here we normalize the C(t)s**

* DCET1\_PKf, Line 280, I didn't understand the following Gaussians usage for the noise.

**Answer** –

**He used it for clustering the noise (to work on a smaller group)**

* DCET1\_PKf, Line ,290? What did he try to do here? Seems like he did not pick any bad C(t)s...

**Answer** –

**He didnt use it at the end.**

* DCET1\_PKf, Line 296, What is the meaning of the following var if he defined both DesiredPseudoTimeBetweenDCEVols and STimeBetweenDCEVols to get the same value?

**Answer** –

**He didnt use it at the end.**

* DCET1\_PKf, Line 312, What is the meaning of the following parameters?

**Answer –**

**Gilad says this is old garbage. He changed it after using Murase.**

* DCET1\_PKf, Line 317, Is this redundant? He just calculated the opposite a few lines above…?

**Answer** –

**Yes.**

* DCET1\_PKf, Line 333,? What is the meaning of the next 2 lines?

**Answer –**

**He tried to take the voxels with high values (artery)**

**ChooseRepVoxelsForAIFFind:**

* ChooseRepVoxelsForAIFFind, Line27, Seems like he is doing here the same calculation as in DCET1\_PKf.m?

**Answer –**

**One of them is redundant. Fixed in newer version.**

**AIFTryf:**

* AIFTryf, Line40, Explain the meaning of all the following numbers...?

**Answer –**

* AIFTryf, Line40, What is the meaning of the gpow space instead of the linear one? that the intervals are not identical?

**Answer –**

**He wanted a bigger resolution in the smaller numbers. Linear space would not necessarily help when trying to find the best kep.**

* AIFTryf, Line 85, Why does he decide these are artery voxels? Don't all the voxels in the tumor get a peak, same as the ones in artery?

**Answer** –

**BinCVI are currently the voxels with high value around bolus. It will change to ones with also low value around the end. Make sure it does!**

* AIFTryf, Line 101, What parameters does he provide the least square fit curve function? and how does it work exactly?

**Answer –**

**lsqcurvefit will minimize the squared error and will return the AIF\_Parker8tx parameters that minimize it.**

**He gives it initial parameters ( OldParams(1:8) ), time domain, mean voxel c(t) anf lower and upper bound for the 8 paramters.**

* AIFTryf, Line 107, Why did he use the following normalization? What is it good for?

**Answer –**

**He wanted to normalize it according to the maximal value he got for all c(t). This is why he divided it by the maximal value it just had and multiplied by the new value he wants. Multiply by the orignal Max Amplitude and divide by the new one created by Parker's method. Then, recalculate the AIF.**

* AIFTryf, Line 162, Why does he calculate the AIF again with the same parameters? He just did it above without changing the arguments.

**Answer –**

**Probably redundant.**

* AIFTryf, Line 218, What is the meaning of interpolating to a lower resolution in the following 2 lines? In addition, I don't understand the shifting and the extrapolation usefulness...

**Answer –**

**He used the interp1 function because it is easy to use altough he didnt really interpolate but only shifted.**

* AIFTryf, Line 227, What is the interpolation if both are the same time resolution? Can't we just shift it?

**Answer –**

**Same as above, east to use the interp1 function. No real meaning for the interpolation.**

* AIFTryf, Line 275, Why is he interested in unique Keps? What is the problem with 2 representing 2 voxels having the same Kep?

**Answer** –

**We now freeze the parameters to calculate AIF, we don't want to use the same parameter (kep in this case) twice.**

* AIFTryf, Line 282, What is the purpose of the following loop exactly?

**Answer** –

**For each keps, create the convolution matrix of exp(-kep\*t).**

* AIFTryf, Line 305, I don't understand the following loop, both technical and for the meaning...?

**Answer** –

**Go over each rep voxel and create the LHS and the RHS as described above.**

* AIFTryf, Line 311, Why did he multiply by Hdt??

**Answer** –

**Might be redundant and cause an error by a factor... Should check it out...**

**DCECostFuncgrT1ForConv:**

* DCECostFuncgrT1ForConv, Line 68, What is the meaning of the following condition? Seems like both are the same...

**Answer –**

**The first one has transpose on it. Used when we work on only one voxel.**

**FindKepBATgAIF:**

* FindKepBATgAIF, Line 35, Make sure the following explanation I wrote is what he meant.

**Answer –**

**Yes.**

* FindKepBATgAIF, Line 87 ,

1. Is least squares equivalent to the method above where he used X=Regressors'\DataToFit' ?

2. I dont understand the starting point it gave. Didnt he mean to give it the negative parameters which are the optimal? Currently he gives "X" which holds the last time shift and kep calculation from before (and is not related to the negative value).

**Answer –**

**1. Yea. Dividing is like least squares just that it gives negative values.**

**2. He ment to give the relevant negative kep. Should fix it if it is not behaving this way...**