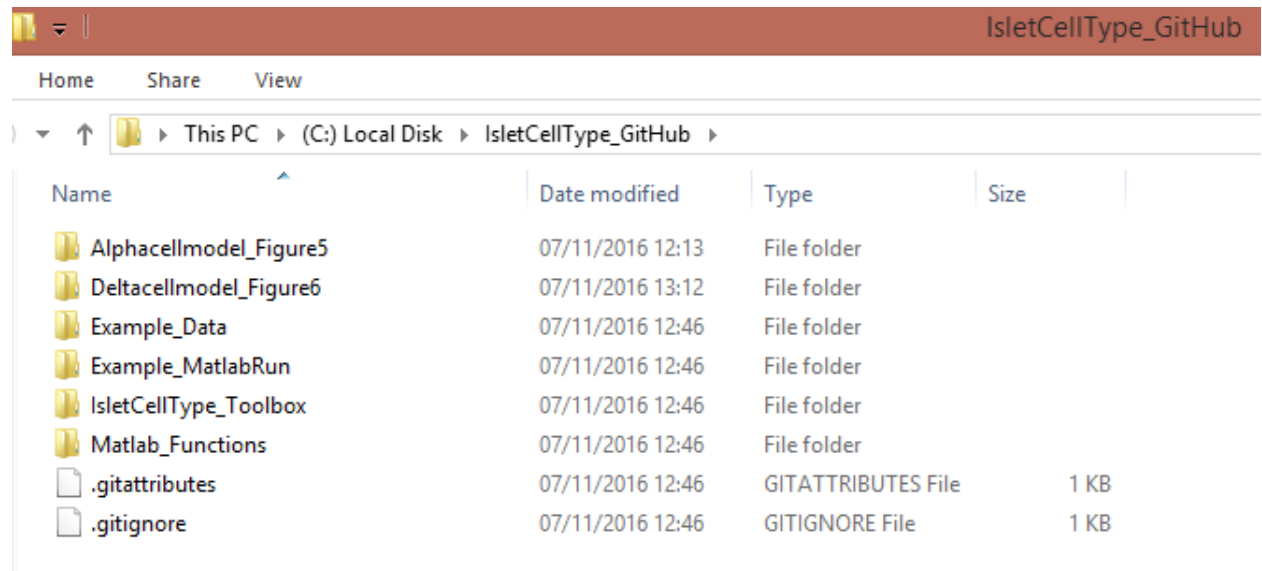# README FILE for supplementary files

In the folder you will find the following subfolders:

- **Alphacellmodel_Figure5**

  This folder contains a .ode file for running in XPPAUT. It is a conductance-based model of the electrical activity in an alpha-cell and is the mathematical model presented in Figure 5.

- **Deltacellmodel_Figure6**

  This folder contains a .ode file for running in XPPAUT. It is a conductance-based model of the electrical activity in a delta-cell and is the mathematical model presented in Figure 6.

- **Example_Data**

  This folder contains a dataset of 200 cell recordings, *Example_Data.xlsx*. The file has 9 columns each pertaining to different experimental variables. The first is the cell-type (1=alpha, 2=beta, 3=delta) as confirmed by immunocytochemistry. The remaining are electrophysiological variables (Table 1 in manuscript). These data can be used to test the multinomial logistic regression model for predicting islet cell-type (Figure 8 in manuscript).

CellType	Acurrent	TailCurrent	Leak	Ccell	Raccess	V2h	kh	Imax
3	0	1	-13.41	4.0460	24	-26.2409	5.3095	-266.5172
3	0	1	-20.2	3.067	21.870	-32.235	5.471	-451.500
3	0	1	-9.007	4.352	20.780	-33.012	6.856	-475.156
3	0	1	-11.85	4.643	19.690	-30.877	6.162	-1267.200
3	0	0	-11.75	5.047	29.060	-87.590	12.255	-592.875
3	0	1	-37.72	3.002	18.620	-93.954	17.279	-561.563
3	0	1	-6.261	3.607	21.080	-79.976	18.237	-736.875
3	0	1	-7.235	3.976	24.900	-32.968	6.601	-864.313
3	0	1	-13.84	2.650	34.710	-33.058	5.608	-1043.900
3	0	1	-9.177	4.337	18.750	-35.623	7.389	-589.875
3	0	1	7.363	3.421	49.000	30.195	4.322	1210.400

- **Example_MatlabRun**
  This folder contains the matlab file *Example_RunMatlab.m*. This can be used to predict islet cell-type in the example dataset *Example_Data.xlsx*. Run this file (changing the *cd* and *path* command appropriately), and it will output for every cell in the file:
  1. The probability of it being an alpha, beta and delta cell (*Probability_abd*)
  2. The predicted cell-type (1=alpha, 2=beta or 3=delta)
  This data is then written to the excel file *Example_Data_Analysed.xlsx*. You can open this and see how the predicted cell type (last column) compares the observed (first column).

- **IsletCellType_Toolbox**
  This folder contains the toolbox as the matlab file *Model.m*. Open this in matlab and run it. It will open up a toolbox which you can use to predict islet cell-type. It also has a help window. Click on help in the toolbox and then the "*?*" symbols to see what you have to input. Try inputting data from *Example_Data.xlsx* and hitting "*Calculate Probabilities*" to see, for that cell, what the multinomial logistic regression model thinks the cell-type is (as given by the probabilities).

Input data		Calculate Probabilities		
Leak (pA)	0	Prob(Alpha)	Prob(Beta)	Prob(Delta)
Access Res (MO)	0	0	0	0
Capacitance (pF)	0	Inactivation parameters		Help
kh (mV)	0			
Maximum Current (pA)	0			
V2h	0			
Tail	No / Yes			
Transient	No / Yes			

- **Matlab_Functions**
  This contains the matlab function *IsletCellType.m*. This is the multinomial logistic regression called in matlab to predict islet cell-type.