**Documentation**

Code locations (note Y: is the cabg network drive)

**Y:\Daniel\Code**

**Y:\IntraoperativeData**

Data locations (note Y: is the cabg network drive)

**Y:\Daniel\Equilibrium Data**

**Setting Up Case Data for Analysis**

1. Create a new Case folder under **Y:\Daniel\Equilibrium Data** with the case number.

2. Open and run **exploreveriqdata.m**.

a. In the UI file selection menu, select the XML case file to open.

b. Click *Data* → *Patient*{1} → *Case*{1}

c. Go through the different *MeasurementSets* and identify all grafts measured by clicking

on one of the *Measurements* and looking at the value of the *VesselName* field. Also

take note of the curve type (either *flow* or *ecg*). In the case where multiple

*MeasurementSets* measure the same graft, take the *MeasurementSet* with the largest

index.

d. Under the Measurement with curve type *flow*, click *curves*, right click

*pulsatileCurve*, and click *Plot selected as new figure*.

e. In the MATLAB plot that opens, identify a region where the flow graph exhibits a

regular periodic pattern. Identify the starting and ending x-values of this region.

f. Record the case, graft type, MeasurementSet, Measurement, starting x-value (Start

Timestep), and ending x-value (End Timestep) of the flow curve type in

**EquilibriumSummary.xlsx**. Also take note whether or not the case has an ECG

measurement.

3. Open **plotWithInterval.m**.

a. Use the values in **EquilibriumSummary.xlsx** to fill in the values at the top of the

code, as follows:

|  |  |
| --- | --- |
| In **plotWithInterval.m** | Value to use |
| caseNum | *Case* from **EquilibriumSummary.xlsx** |
| measurementSet | *MeasurementSet* from **EquilibriumSummary.xlsx** |
| measurement | *Measurement* from **EquilibriumSummary.xlsx** |
| ecgMeasurement | If an ECG measurement does not exist, set *ecgMeasurement* = -1. If it does exist, set *ecgMeasurement* = *measurement* + 1. |
| firstTimeStep | *Start Timestep* from **EquilibriumSummary.xlsx** |
| lastTimeStep | *End Timestep* from **EquilibriumSummary.xlsx** |
| vesselNameString | *Vessel* from **EquilibriumSummary.xlsx** |

b. Run **plotWithInterval.m**. In the UI file selection menu, open the XML case file. Two

UI file save menus will show up. For both, click *Save*.

c. In the MATLAB plot that comes up, check if there is a stable ECG signal (or an ECG

signal at all) and make a note of it in **EquilibriumSummary.xlsx.**

d. If there is a stable ECG plot with at least 4 pulses, take note of the starting times of 5

systoles and 4 diastoles. Multiply these time values by 220.9 and put them into

**ecgSummary.xlsx**.

e. In MATLAB, create a new variable called **ecgSummary** and paste all data from

**ecgSummary.xlsx** into it. Save it as a MAT file in **Y:\Daniel\Equilibrium Data**.

4. Open **saveRawData.m**.

a. Insert *caseNum*, *measurementSet, measurement,* and *vesselNameString* in the same

way as in step 3a above.

b. In the UI file selection menu, open the XML case file. A UI file save menu will show

up. Click *Save*.

5. Create a MATLAB file where the first column is the case number, the second column is the

graft type, and the third column is either ‘L’ (if the graft goes to the left region) or ‘R’ (if the

graft goes to the right region). Save this as **leftRightSummary.mat**.

6. Create a copy of **ecgSummary.mat**, but include only the cases and vessels that are included in

**leftRightSummary.mat**, and add a final column with ‘L’ and ‘R’.

**Code for Data Analysis**

Each of the following generates a plot with the mean, median, and standard deviation, allowing for statistical analyses to be done.

|  |  |
| --- | --- |
| **Name** | **plotBFByVesselType.m** |
| **Required Files** | *Equilibrium Data\Case0XX\VESSELNAME.mat* |
| **Description** | Plots backwards flow (in %) as a function of graft type. |

|  |  |
| --- | --- |
| **Name** | **plotDFByRegion.m** |
| **Required Files** | *Equilibrium Data\ecgSummary*  *Equilibrium Data\Case0XX\VESSELNAME\_flow\_raw.mat* |
| **Description** | Plots diastolic filling (in %) as a function of graft type and whether the graft goes to the left or right territory. |

|  |  |
| --- | --- |
| **Name** | **plotDFByVesselType.m** |
| **Required Files** | *Equilibrium Data\ecgLeftRightSummary*  *Equilibrium Data\Case0XX\VESSELNAME\_flow\_raw.mat* |
| **Description** | Plots diastolic filling (in %) as a function of graft type. |

|  |  |
| --- | --- |
| **Name** | **plotFlowByRegion.m** |
| **Required Files** | *Equilibrium Data\ecgLeftRightSummary*  *Equilibrium Data\Case0XX\ VESSELNAME\_avg.mat* |
| **Description** | Plots mean flow (in mL/min) as a function of graft type and whether the graft goes to the left or right territory. |

|  |  |
| --- | --- |
| **Name** | **plotFlowByVesselType.m** |
| **Required Files** | *Equilibrium Data\Case0XX\VESSELNAME\_avg.mat* |
| **Description** | Plots mean flow (in mL/min) as a function of graft type. |

|  |  |
| --- | --- |
| **Name** | **plotPIByVesselType.m** |
| **Required Files** | *Equilibrium Data\Case0XX\VESSELNAME\_pulsatility\_avg.mat* |
| **Description** | Plots the pulsatility index as a function of graft type. |
| **Special Note** | The *outlierThreshold* variable allows all values greater than *outlierThreshold* to be excluded from analysis (allowing outliers to be manually filtered out). |