Main Doc

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# Overview

The code in this folder mainly accomplishes the tasks regarding deformable registration using coherent point drift method. The data from two experiments are processed using the utilities in this folder –Cartesian robot exploration and PSM robot exploration. The main scripts for each experiment are in ***Scripts\_Cartesian*** and ***Scripts\_PSM*** respectively.

There are two data folders, named ***Cartesian\_Data*** and ***PSM\_Data***. ***Cartesian\_Data*** is used to store all original and registration results for the deformable registration using explration data collected from Cartesian. ***PSM\_Data*** is the one for dVRK PSM robot.

# Main scripts

For each of Cartesian robot and PSM experiments, three scripts are used to processed the data. These three scripts are consistent with Long’s JMR draft, section of updating virtual fixtures.

|  |  |  |
| --- | --- | --- |
| Case Cartesian | Case PSM | Description |
| APP\_RegGetCurveFromLaserToSTL | APP\_IncpCurveToSTL | To incorporate the digitized VF curve from nondefomred phantom to the A-priori model. |
| APP\_RegSTLToLaserScan | APP\_RegAprToLaser\_PSM | To register the A-priori to the laser scan data. |
| APP\_RegSTLToRobot | APP\_RegAprToRobot\_PSM | To register the A-priori to the robot exploration data. |

To see the results of registrations, run the following functions (run **Setup\_Dir\_DeformableReg** to set up the directories first):

|  |  |
| --- | --- |
| Command | Description |
| **Plot\_deformReg\_iteration\_info\_PSM**(50,'laser') | Plot the registration result of laser scanning as comparison baseline for PSM. |
| **Plot\_deformReg\_iteration\_info\_PSM**(50,'robot') | Plot the registration result of PSM exploration. |
| **Plot\_deformReg\_info\_Cartesian**('laser') | Plot the registration result of laser scanning as comparison baseline for Cartesian. |
| **Plot\_deformReg\_info\_Cartesian**('robot') | Plot the registration result of Cartesian exploration. |

# Cartesian Data

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| --- | --- | --- |
| Data Name | Format | Description |
| curveLaser | Mat | The registered VF curve using Laser scan data (the VF curve that is transformed from a-priori data using the transformation obtained from the registration) |
| curveRobot | Mat | The registered VF curve using robot exploration data (the VF curve that is transformed from a-priori data using the transformation obtained from the registration) |
| DeformedPointCloud | Mat | The laser scan data of the deformed environment. |
| DeformedTargetCurve | Mat | The digitized ground truth of the deformed environment. |
| JHU\_Deformed\_T5\_Merged | Mat | The robot exploration data. |
| JHU\_Exp\_1 |  |  |
| laser2stl\_getCurve\_ws |  |  |
| NonDeformedPointCloud | Mat | The laser scanned data of the undeformed environment, which is used to incorporate the digitized curve to the a-priori model |
| NonDeformedTargetCurve | Mat | The digitized curve in undeformed environment. |
| stl2laser\_ws |  |  |
| stl2robot\_ws |  |  |
|  |  |  |

# PSM Data

|  |  |  |
| --- | --- | --- |
| Data Name | Format | Description |
| Deformed\_curve\_robot\_digitized\_PSM | Mat | The digitized ground truth curve, digitization using PSM robot. |
| PSMCurveIncorpApriori | Mat | The incorporated curve with the a-priori model. |
| PSMExplrPtCloud | Mat | The exploration data using PSM. |
| Folder RegAprToLaser | Mat | The registration results from each iteration for laser data. |
| Folder RegAprToRobot | Mat | The registration results from each iteration for robot data. |