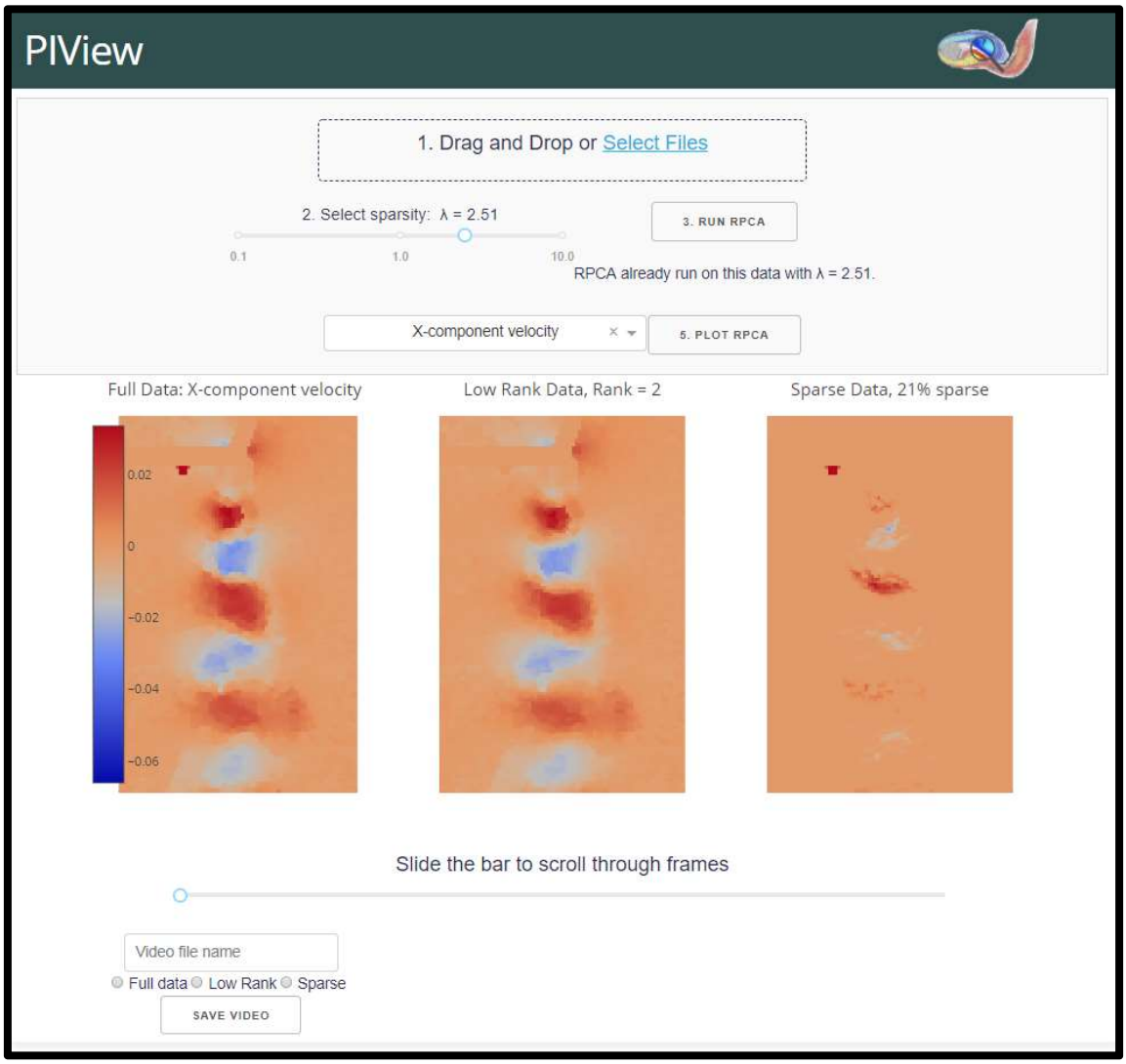
PIView User Guide



Welcome to PIView!

PIView is a visualization program for PIV data with RPCA filtering to remove noise.

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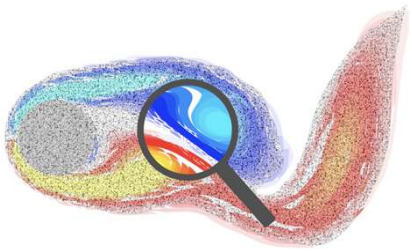
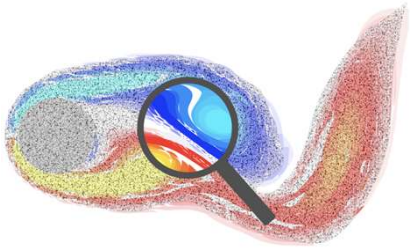


Installation and Set Up



Instructions to set up through the command line:

1. Ensure that you have a conda package installed on your machine.

   Option 1: Anaconda package downloadable from:
   https://www.anaconda.com/dowload

   Option 2: Miniconda package downloadable from:
   https://conda.io/miniconda.html

2. Open the new Anaconda or Miniconda program and it will provide a command line prompt. Navigate to the folder where you would like to save the PIView program.

   If this is unfamiliar, please Google 'command line instruction cd to navigate through directories'. You may need to add your operating system (Windows, OSX, Linux) to the Google search.

3. The example data (and data you may be using) may be in large .mat files. We suggest installing the git LFS package available from:
   https://git-lfs.github.com/

4. Clone or download and save the Github repository into the folder on your computer:
   https://github.com/ischerl/RPCA-PIV-Processing.git

5. Navigate into the RPCA-PIV-Processing folder in the command line. Create a conda environment from the environment.yml file by entering into the command line:

   ```
   conda env create -f environment.yml
   ```

6. Activate the new environment by entering into the command line:

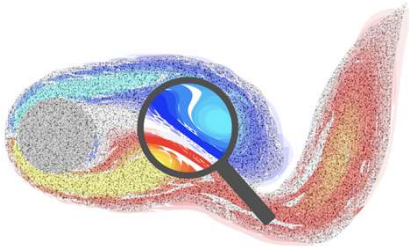
   If working in Windows: activate rpca
   If working in Linux or OSX: source activate rpca

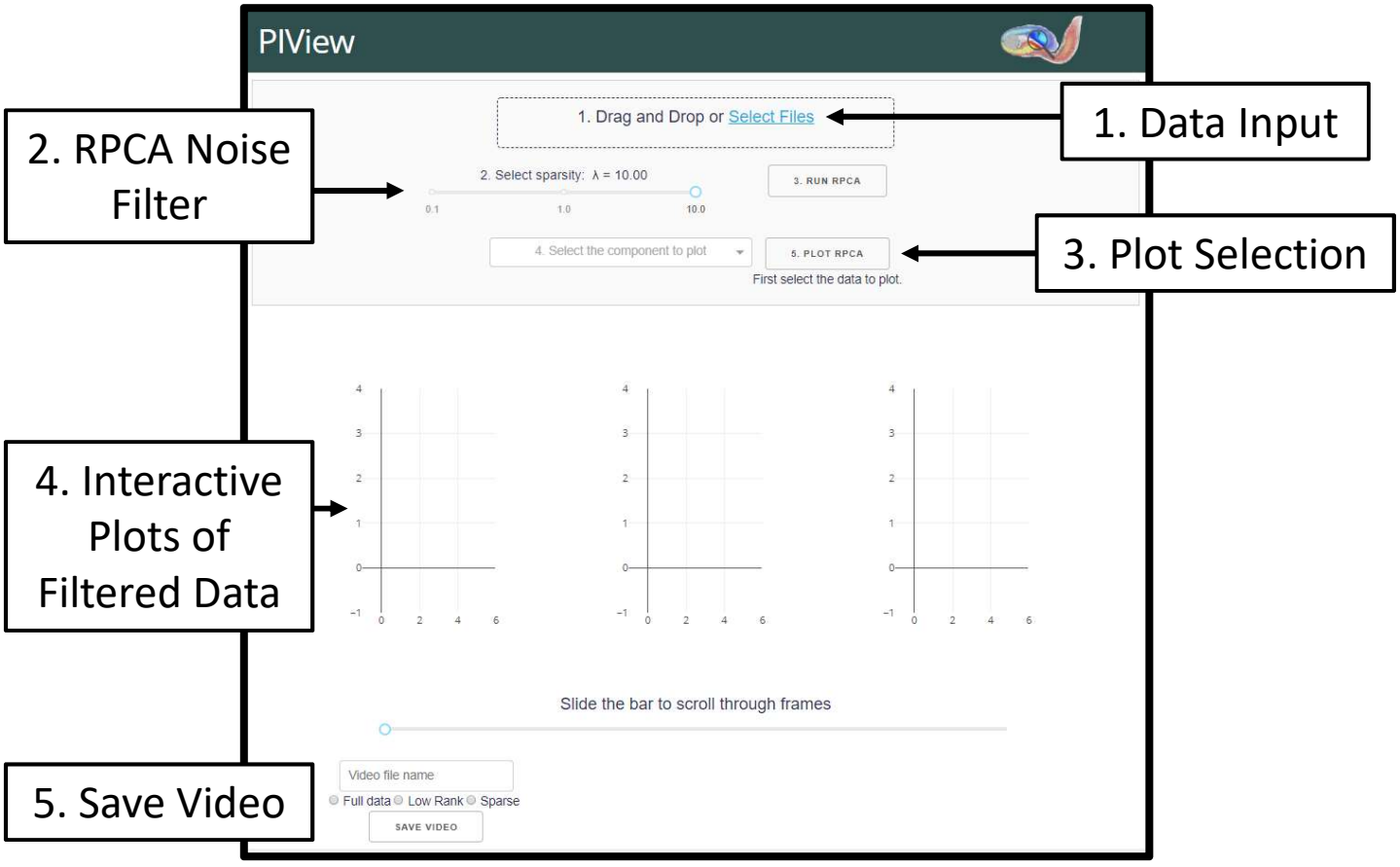
7. In the command line navigate to the folder: …/RPCA-PIV-Processing/piview and run the application by entering this into the command line:

   ```
   python app_v3.py
   ```

8. Copy the link that appears in the command line window, paste into a web browser, and you'll see the user interface appear.

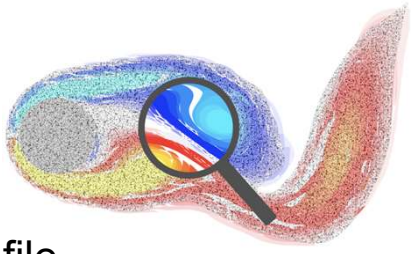
Introduction to the User Interface





The user interface provides numbered steps to guide you through the processes of inputting data, choosing a noise filter sparsity value, reviewing the filtered data in the interactive plot window, and outputting a video file.

Preparing & Selecting Data File



1. Prepare PIV data by making sure it is in a .mat file.

2. Two examples of .mat files are available in folder:
   …\RPCA-PIV-Processing\piview\data
   File name 1: cyl_piv_trimmed
   File name 2: cyl_sim_noise

3. The .mat file should have only two variables:
   One variable named ‘u_x’ contains velocity values in the x-direction.
   One variable named ‘u_y’ contains velocity values in the y-direction.

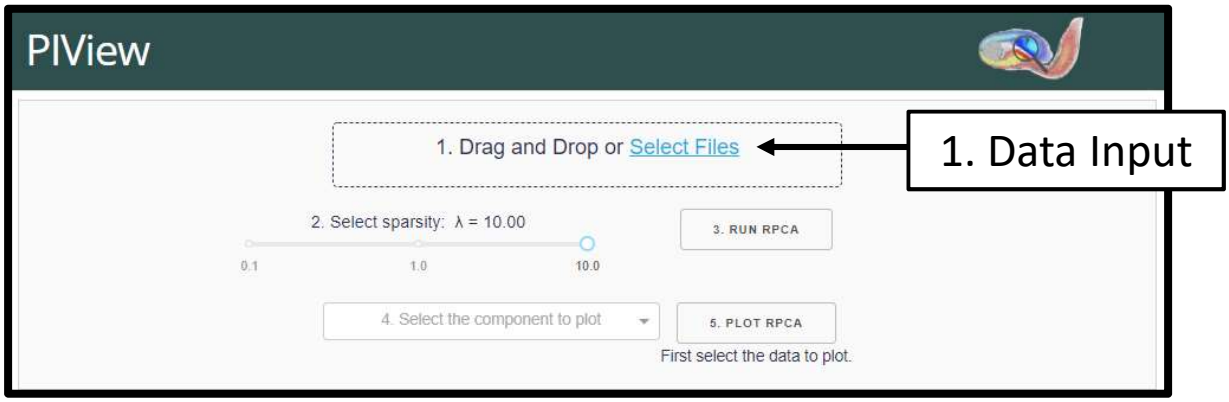
4. Both variables should be 3 dimensional arrays of size m x n x k:
   m represents the number of pixels in the vertical image direction.
   n represents the number of pixels in the horizontal image direction.
   k represents the number of frames in the video, or steps in time.

5. The arrays should consist of floating point scalars representing fluid velocity at each pixel location, at each time step.

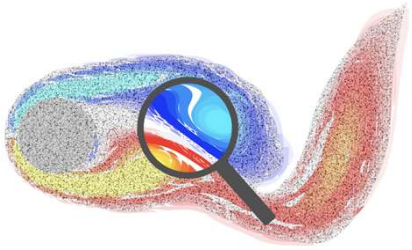
6. Save the .mat file with your PIV data in this folder:
   …\RPCA-PIV-Processing\piview\data

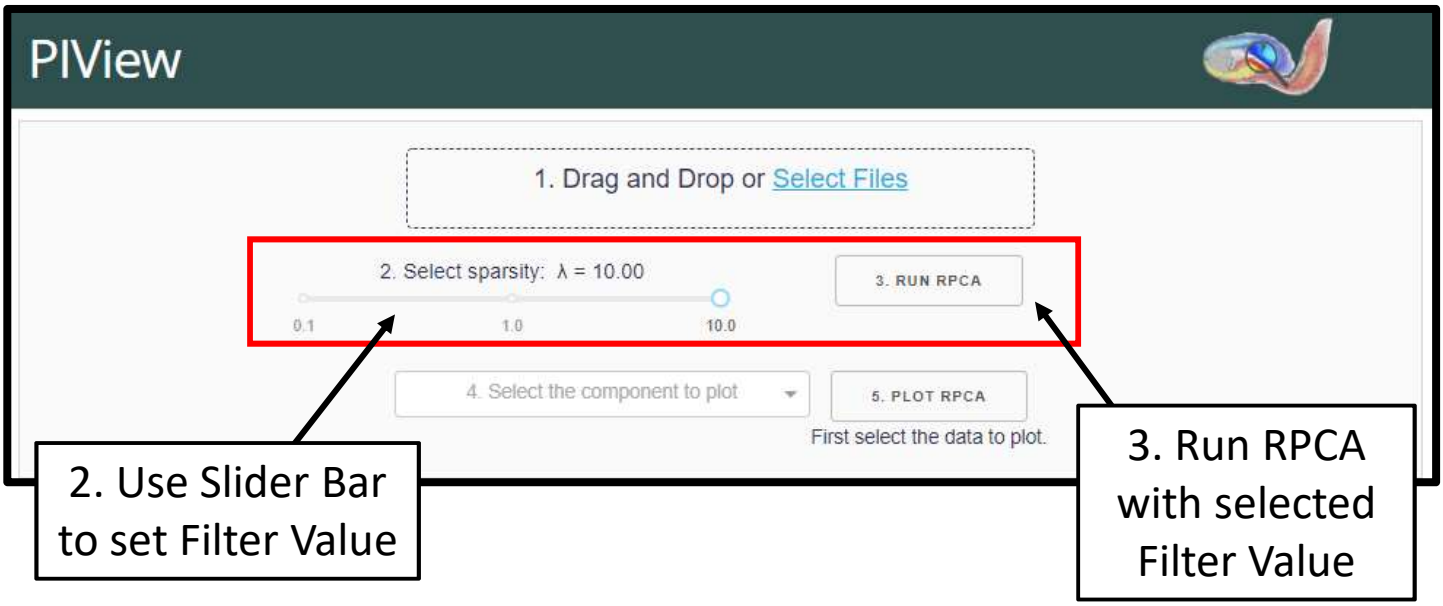
7. In the PIView user interface, click on Select Files and find your data file in the folder: …\RPCA-PIV-Processing\piview\data

8. If you would like to follow along with the User Guide tutorial, choose ‘cyl_piv_trimmed’ as the data file.



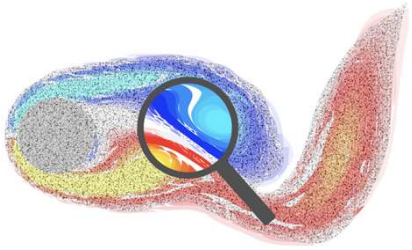
Select Noise Filter Level

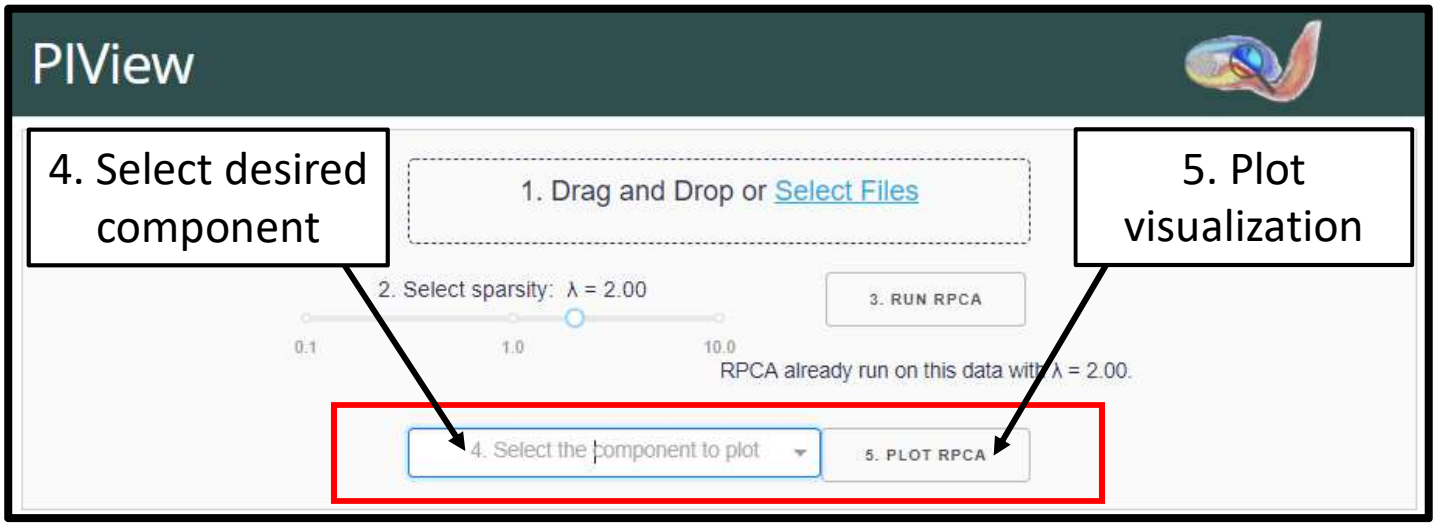




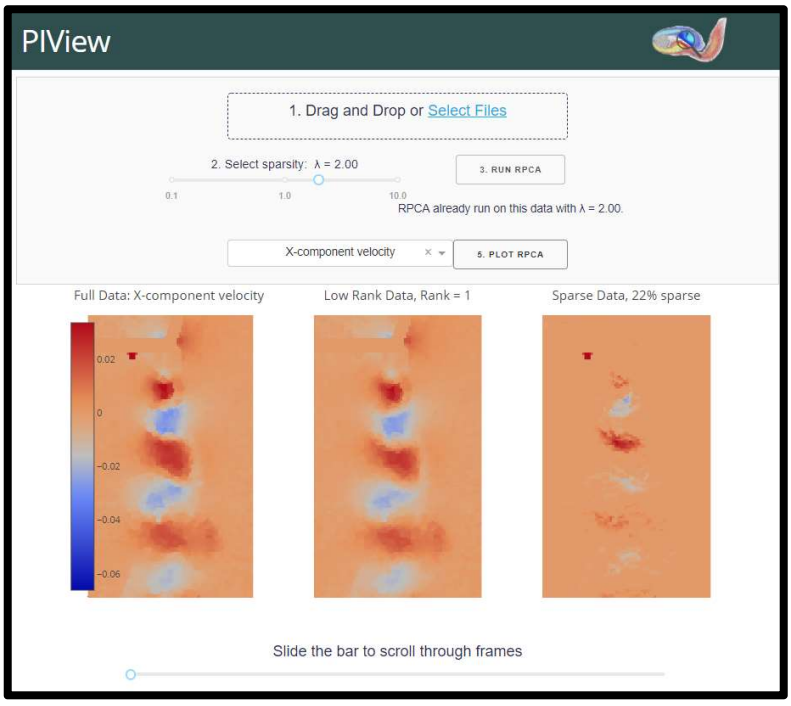
1. The noise filter process can be demonstrated with either of the example data files – the user guide will use file ‘cyl_piv_trimmed’.
2. After selecting the data file, choose the noise filter’s ‘sparsity value’ by moving the position of the indicated slider. We recommend starting with a sparsity value of 2.
3. Click the button labeled: 3. RUN RPCA
4. You should see a message under the button that says “Save Successful” or “RPCA already run on this data with 2.00”.

Select Data Component & Plot

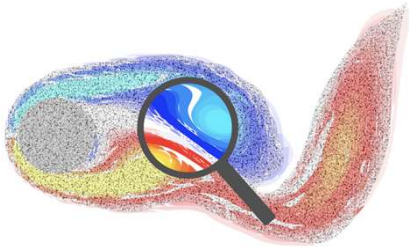


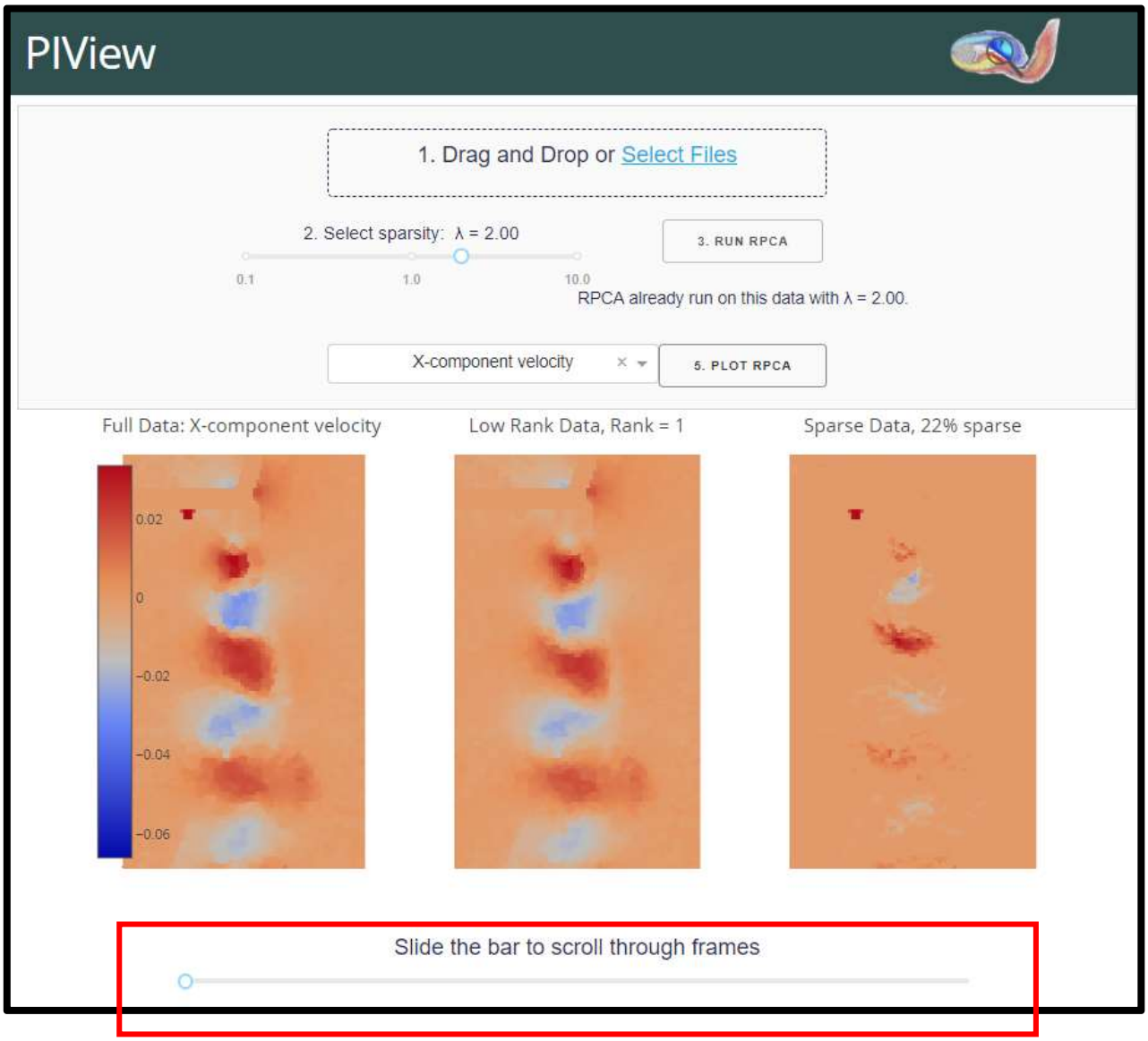


1. Choose the component you would like to plot from the dropdown menu - we chose X-component velocity.
2. Click the button labeled: 5. PLOT RPCA
3. You should see the plots fill in with images, as shown below.



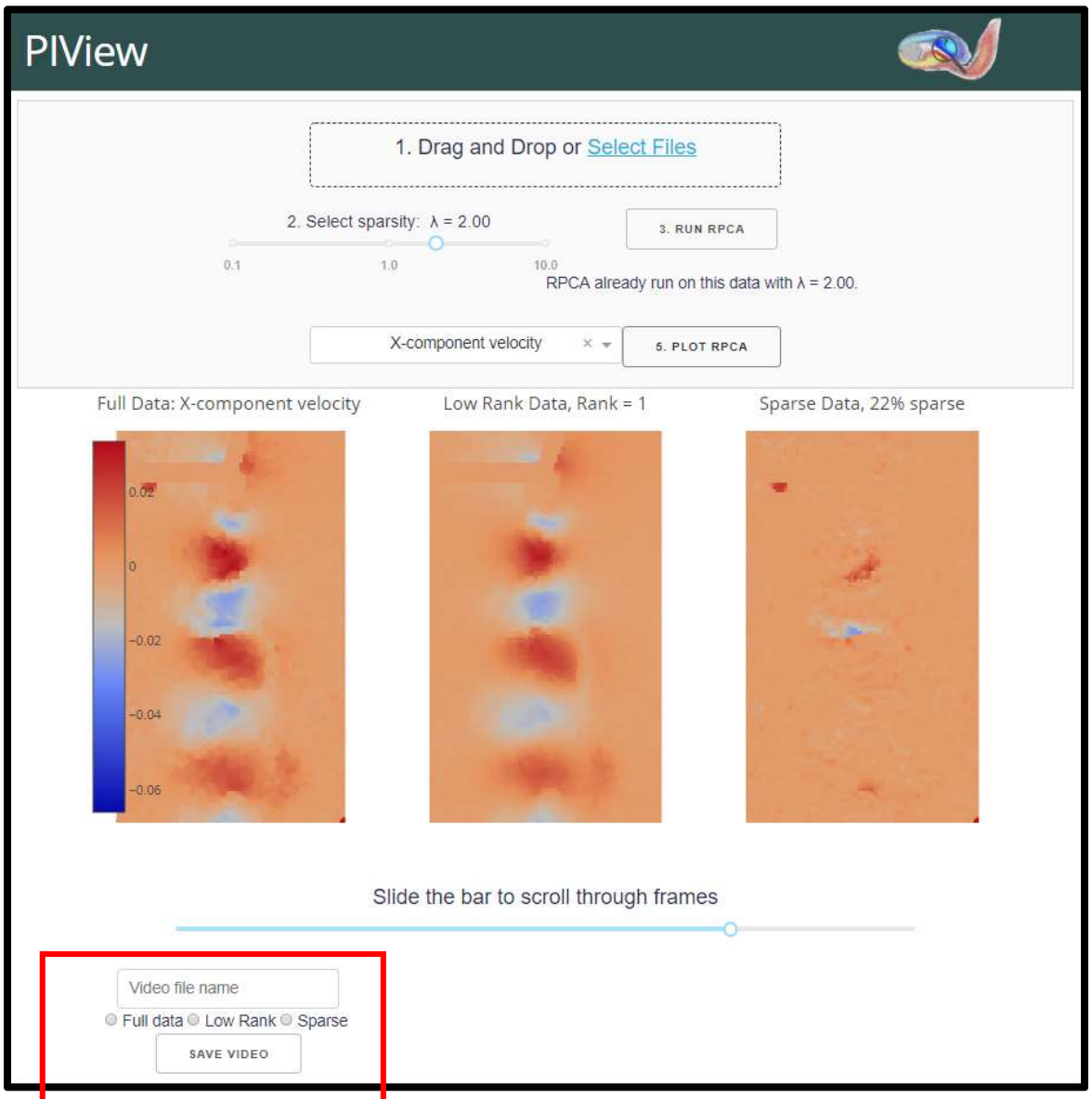
Review Noise Filtered Data





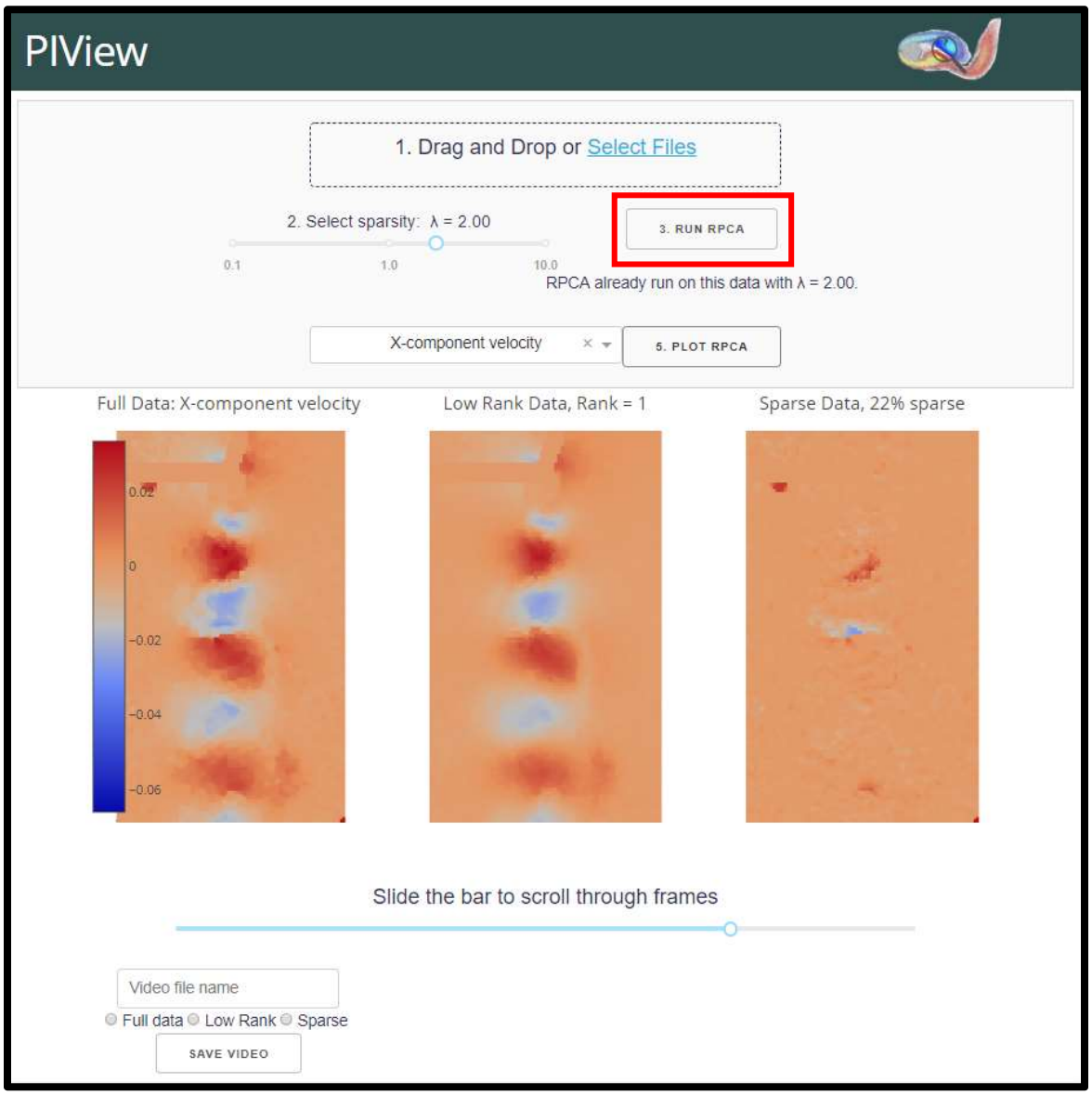
1. Use the Slider below the images to scroll through the noise filtered data.
2. If there is too much data in the ‘Sparse Data’ plot on far right, try choosing a higher Sparsity Value.
3. If there is still too much noise in the center plot “Low Rank Data”, try choosing a lower Sparsity Value.

Saving Video



1. Once you are satisfied with the noise filtering, you have the option to save a video file.
2. Type in the file name, chose the plot you would like to save, and click the button labeled: SAVE VIDEO
3. The video will be saved as a .avi file in the folder: …\RPCA-PIV-Processing\piview

Saved RPCA Output Files



1. Running RPCA will save processed .mat files in the folder:
   …\RPCA-PIV-Processing\piview\data