

## Donato Lab Block Course Day 2 24.05.2022

### Task 1:

Q 1.1: Write down the raw matrix number of rows and columns!

Q 1.2: What information is carried in the rows and the columns of the tracking matrix

Q 1.3: What is the read out of the first column of the raw matrix?

Q 1.4: Write down the index for the first X-Coordinates, Y-Coordinates, and the estimator value

Q 1.5: After looking at the video in the task 1 folder which body part do you expect to be tracked the best, which body part is tracked the worst?

Q 1.6: Think of a statistical or mathematical operator with which we can calculate the overall accuracy of the tracking for all frames?

Q 1.7: Why is your chosen operator more suitable to calculate the overall accuracy than others?

Q 1.8: The new estimator matrix differs in size. What are its dimensions? What do we have to keep in mind when using this estimator matrix to draw conclusions for the raw matrix?

Q 1.9: Which body part appears to give the best results? Which gives the worst results? Does this match your expectation from Q 1.5?

Q 1.10: Find the best and the worst body part to track and show their tracks in this answer. Save the Plot with the saving symbol in the figure widow.

Q 2.1: Look at the matrix head\_neck. Write down what data is given in the corresponding column! Column1 = ; Column2 = ; Column3 =

Q 2.2: How can we calculate the coordinates for a new reference point from the existing data, what information do we need for this?

Q 2.3: What are the X and Y coordinates for the upper left corner of the arena?

Q 2.4: What do you set with k-Variable in the movmean function? How does it "smoothen" the running trajectory?

Q 2.5: What happens after you increased the k-value? How does the plot change?

Q 2.6: Why do we calculate to\_x - from\_x and to\_y-from\_y in the Pythagorean equation?

Q 2.7: The Pythagorean equation gives us the distance between two points, but what format is the distance between two points on an image given?

Q 2.8: What is the length of the arena side wall in pixel?

Q 2.9: What is the cm/pixel ratio ?

Q 2.10: If everything worked out correctly, the distance the animal traveled should be in a biological possible range for a mouse to run in 30 minutes. Convert the distance from cm into meter and check this for your value ! How far did the mouse run?

Q 2.11: If everything worked out correctly, the distance the animal traveled should be in a biological possible range for a mouse to run in 30 minutes.

Convert the distance in cm into meter and check this for your value! How far did the mouse run?

Q 2.12: How do we converge the previous time scale to seconds?

Q 2.13: Save the plot and paste it in the questionnaire text file!

Q 3.1: How do you choose the k-value for the speed? What biological and computational aspects do you consider?

Q 3.2: Did your considerations changed the plot as you expected? If not, explain why and how you changed the k-value!

Q 3.3: Find a good low-bound threshold for the running speed. Think about the biological background, what does running imply and how can the tracking fool us!

Q 3.4: Did your considerations turned out as expected? If not, explain why and how you changed the k-value!

Q 3.5 Which behavior was recorded more often running or resting, report the total number of frames for each behavior? Can you express it in %?

Q 3.6 Look at the variable F\_upphase and derive by the matrix size, how many cells were detected in this set?

Q 3.7: What can we derive from this plot already?

Do you see something in particular that meets your expectations and ideas?

Where do the events have the highest frequency?

Q 3.8: Save the figure that shows the speed, running behavior, raster plot and event frequency and paste it here!

Does the event rate fit your expectations?

Q 3.9: Plot the animals running path and plot the neuronal events on the path.

Look for different cells, that you would consider place cells. Save some figure and paste them it in the questionnaire!