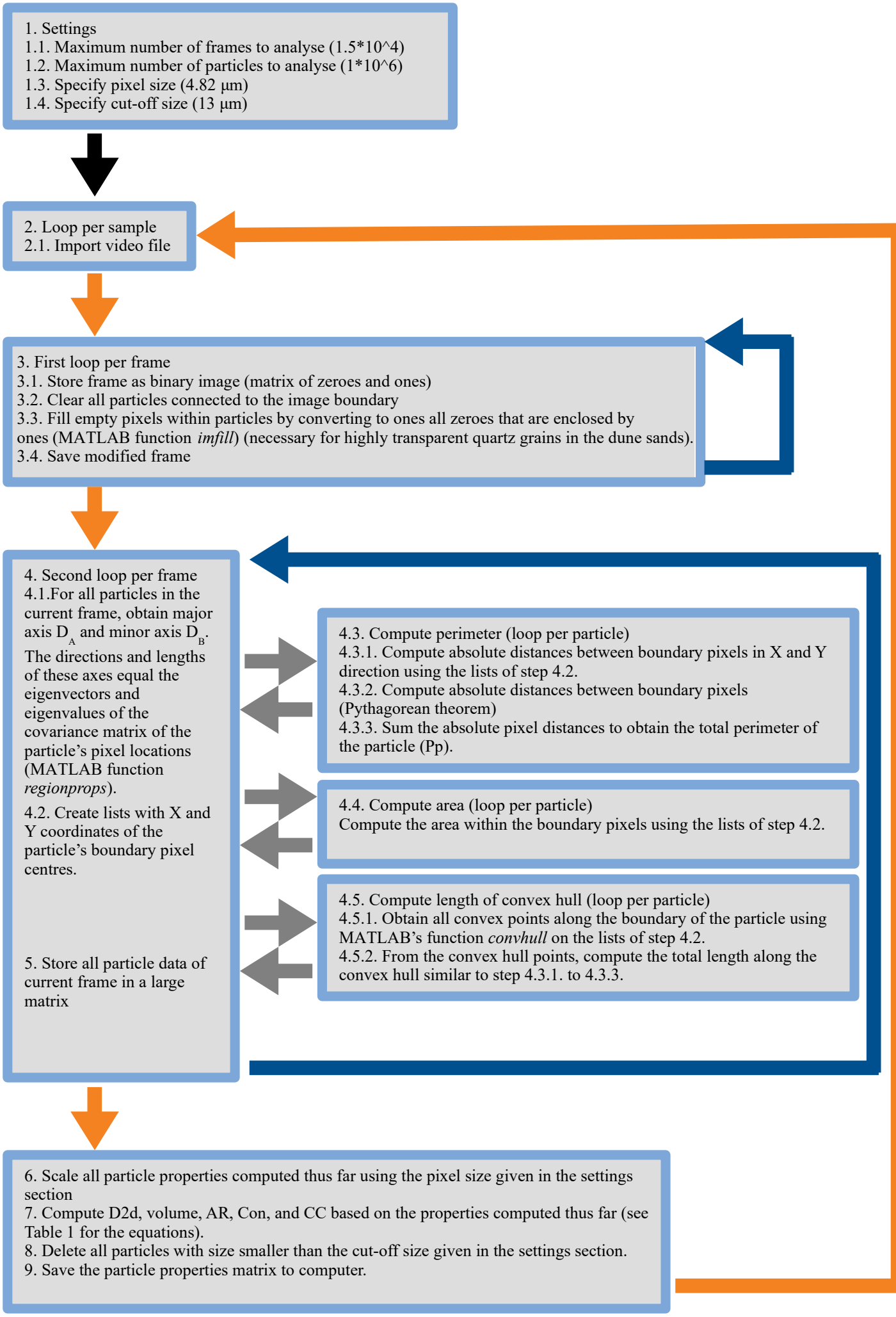
1. Settings
1.1. Maximum number of frames to analyse (1.5*10^4)
1.2. Maximum number of particles to analyse (1*10^6)
1.3. Specify pixel size (4.82 µm)
1.4. Specify cut-off size (13 µm)
2. Loop per sample
2.1. Import video file
3. First loop per frame
3.1. Store frame as binary image (matrix of zeroes and ones)
3.2. Clear all particles connected to the image boundary
3.3. Fill empty pixels within particles by converting to ones all zeroes that are enclosed by ones (MATLAB function imfill) (necessary for highly transparent quartz grains in the dune sands).
3.4. Save modified frame
4. Second loop per frame
4.1.For all particles in the current frame, obtain major axis D_A and minor axis D_B. The directions and lengths of these axes equal the eigenvectors and eigenvalues of the covariance matrix of the particle's pixel locations (MATLAB function regionprops).
4.2. Create lists with X and Y coordinates of the particle's boundary pixel centres.
5. Store all particle data of current frame in a large matrix
4.3. Compute perimeter (loop per particle)
4.3.1. Compute absolute distances between boundary pixels in X and Y direction using the lists of step 4.2.
4.3.2. Compute absolute distances between boundary pixels (Pythagorean theorem)
4.3.3. Sum the absolute pixel distances to obtain the total perimeter of the particle (Pp).
4.4. Compute area (loop per particle)
Compute the area within the boundary pixels using the lists of step 4.2.
4.5. Compute length of convex hull (loop per particle)
4.5.1. Obtain all convex points along the boundary of the particle using MATLAB's function convhull on the lists of step 4.2.
4.5.2. From the convex hull points, compute the total length along the convex hull similar to step 4.3.1. to 4.3.3.
6. Scale all particle properties computed thus far using the pixel size given in the settings section
7. Compute D2d, volume, AR, Con, and CC based on the properties computed thus far (see Table 1 for the equations).
8. Delete all particles with size smaller than the cut-off size given in the settings section.
9. Save the particle properties matrix to computer.