DETECTION OF CONCENTRIC CIRCULAR PATTERNS THROUGH FILTERS, OVAL DETECTION AND METAHEURISTICS.

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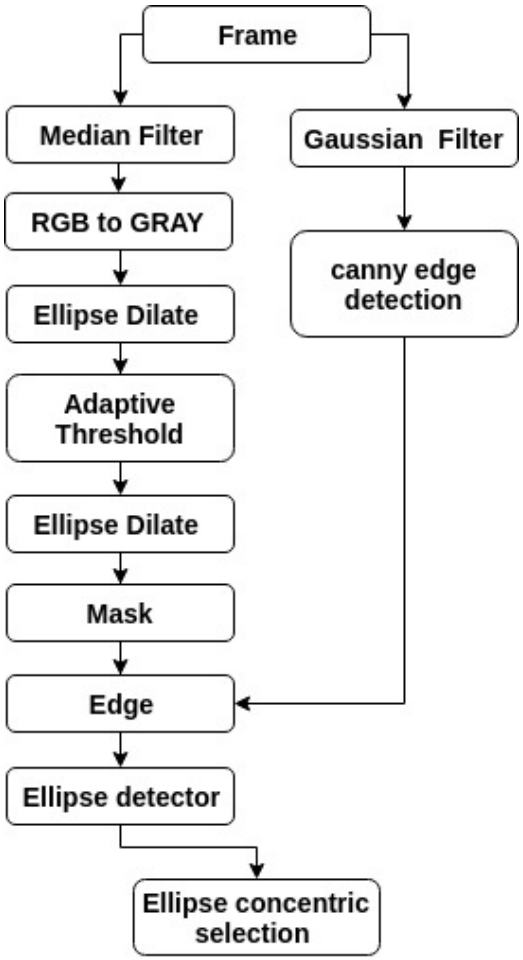
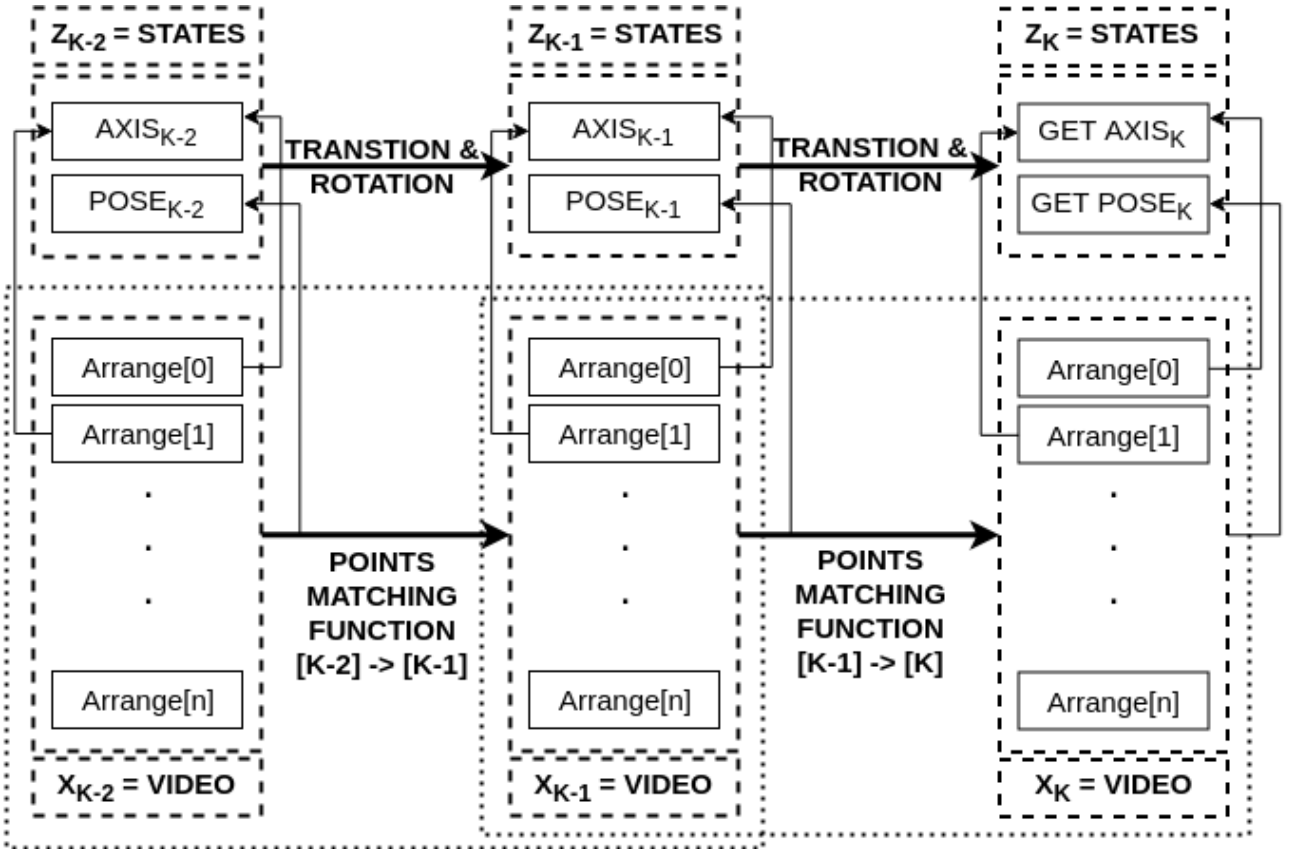
DETECTION AND TRACKING STEP



DETECTION PIPELINE



TRACKING PIPELINE: STATE ESTIMATION

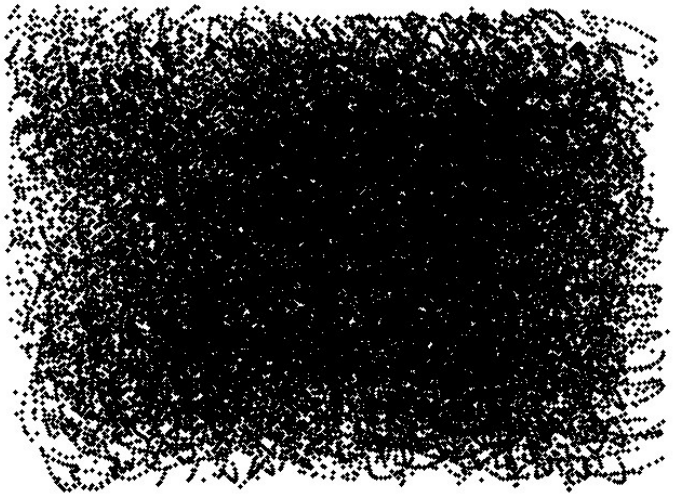
DENSITY DISTRIBUTION

The sector density method include quad segmentation over scene, in our case we define 4x5 sectors due the window size and proportion. To set the maximum number of points per zone or density (p), we establish a maximun number of frames to use in calibration process (N_{frames}), then based on number of elements per arrange ($N_{arrange}$) and total number of sections ($N_{sections}$), we define equation 1:

$$p = \frac{N_{frames} * N_{arrange}}{N_{sections}} \quad (1)$$

Algorithm Density Distribution (Vector of IFrames):
$p = N_{frames} * N_{arrange}/N_{sections}$
for $S = 1$ **to** $N_{sections}$ **do**
  for $F = 1$ **to** N_{frames} **do**
    Evaluate density with Iframes[F]
    if Pass evaluation **then**
      Add frame to OFrames
    end if
  end for
end for
return Vector of OFrames

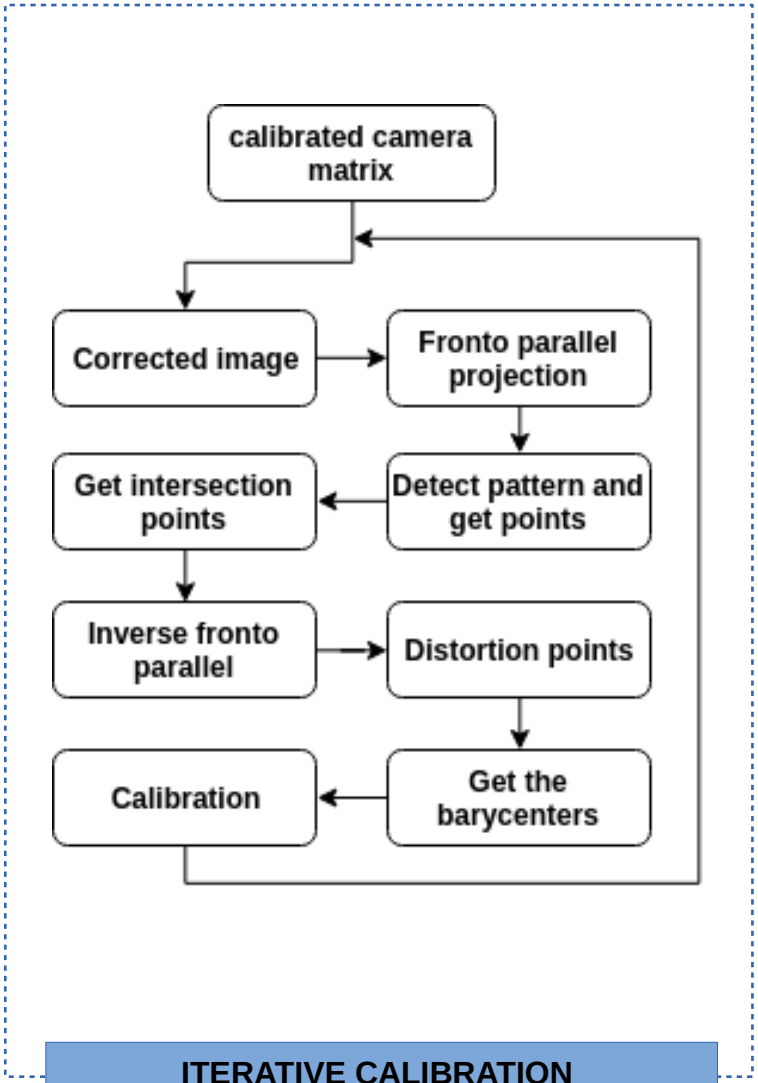
DENSITY DISTRIBUTION ALGORITHM



NO SAMPLED DISTRIBUTION: CONCENTRIC RING

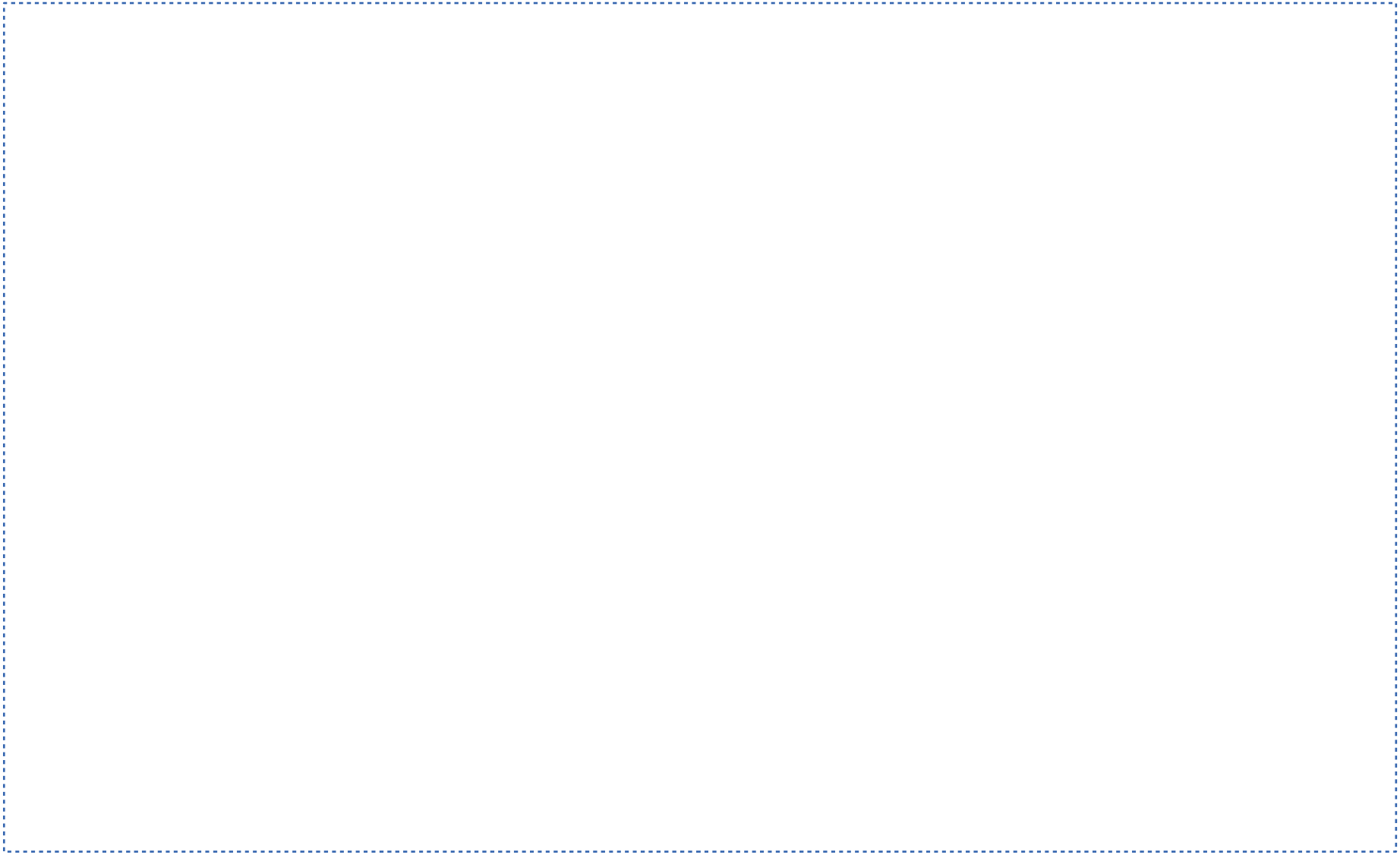
SAMPLED DISTRIBUTION: CONCENTRIC RING

ITERATIVE CALIBRATION REFINEMENT

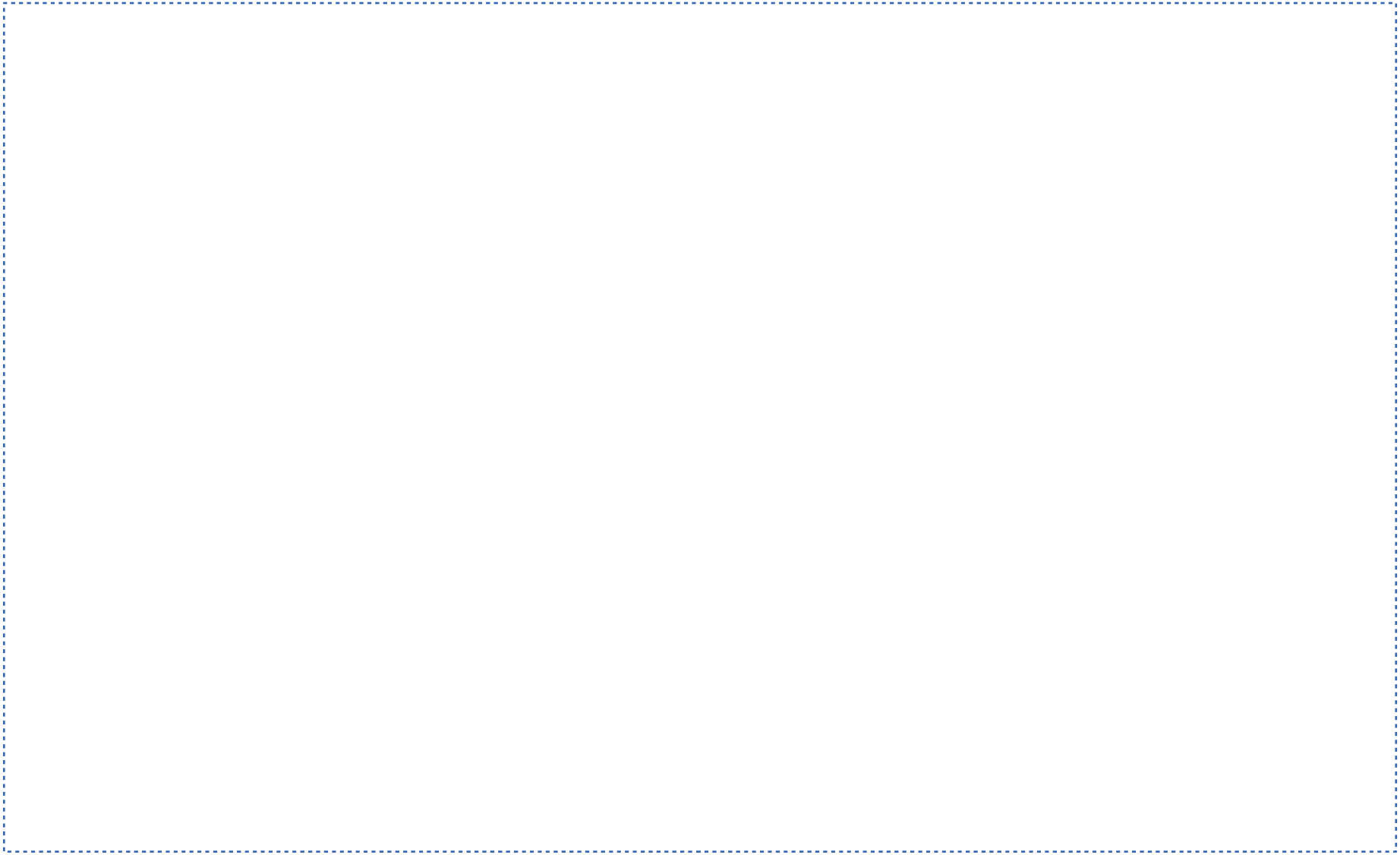


ITERATIVE CALIBRATION REFINEMENT PIPELINE

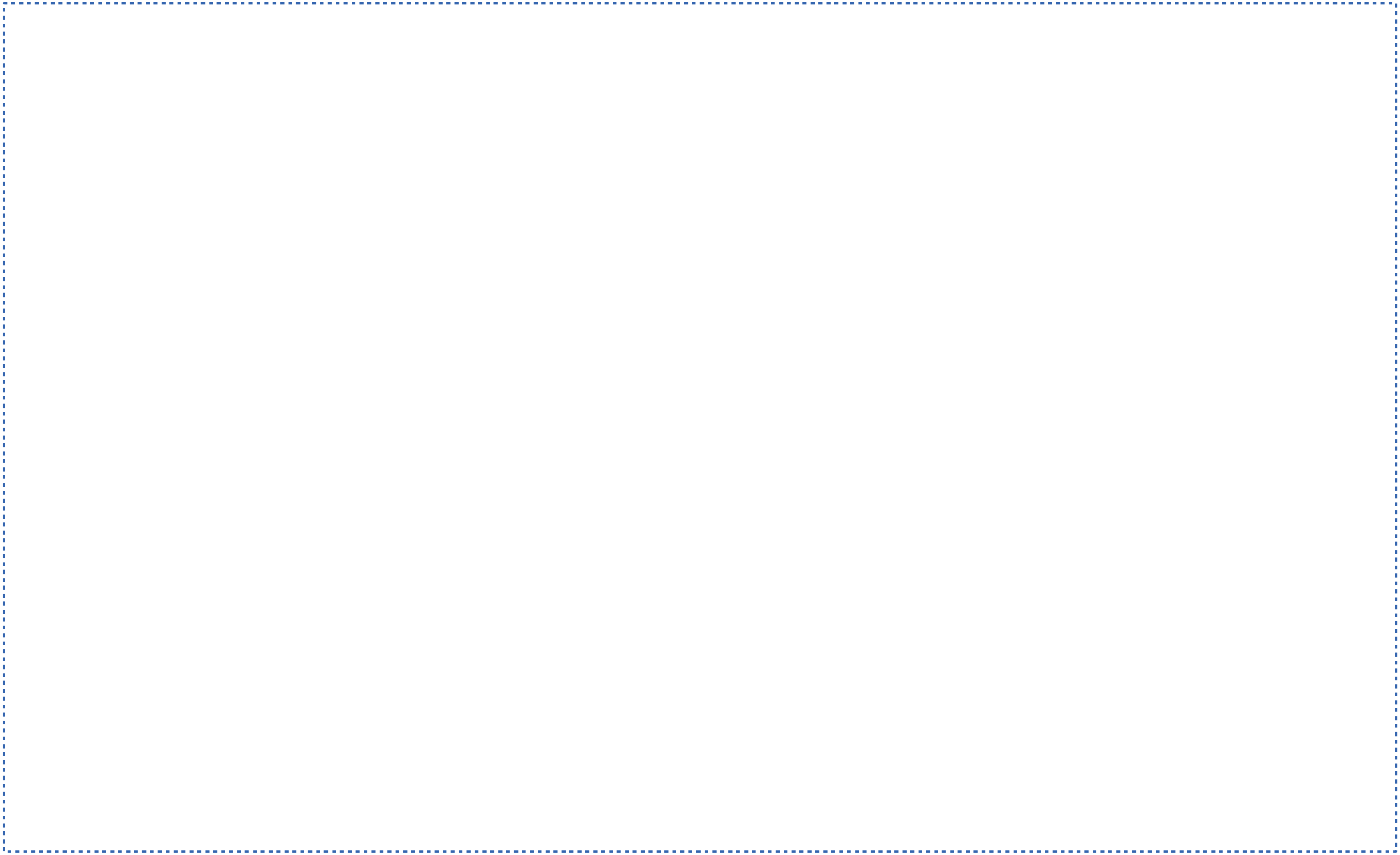
RESULTS: ASYMMETRIC DISCS



RESULTS: CHESSBOARD



RESULTS: CONCENTRIC RINGS



RESULTS: FINAL COMPARATIONS

CONCLUSIONS