Fluendo Jr. CV Technical Test – Mar Coch Alcina

Q2

1. Which algorithms would you use to achieve this? Please provide at least 2 proposals.

I don't think a "traditional" approach (using edge/color detection, SVM…) would be the best nowadays given the advancements in neural networks. Keeping in line with the previous answers, a possible approach would be using CNNs designed for image detection, such as:
- Deep SORT (https://github.com/nwojke/deep_sort)
- Faster R-CNN (https://github.com/jwyang/faster-rcnn.pytorch)
- YOLO v8 (https://github.com/ultralytics/ultralytics)

Deep SORT is a standalone algorithm that implements multi-object tracking and scene understanding. Faster R-CNN is an excellent object detection algorithm but could require the addition of more robust tracking techniques than the implemented. YOLO is efficient for real-time object detection, and with v8 it has several models that implement classifying (trained with ImageNet), detection, segmentation, tracking and posing, trained with COCO.

2. Which potential bottlenecks may this problem encounter? (i.e. non-static camera). Just list them (if any)

Through a bettered deep learning approach, a more robust and better performing model could be achieved, however, the same issues remain, which most get solved through proper data and training:
- Lightning changes (weird shadows, rain, etc.), different camera angles, zoom in/out…
- Input video quality (noise, distortion, resolution…)
- Occlusions and rotation of players and ball
- Very alike jerseys/uniforms and background

3. Could your proposals be scaled to other team-based sports? (i.e. hockey, rugby, …) Which would be worst-case scenarios?

To achieve high accuracy, the model would have to be retrained with appropriate data for each sport. The same starting point could be reused, but if we input a different sport to the football-trained model, the results would vary. Team sports played on grass should do better than for example basketball, but rugby's ball is not round and is usually brown, so the football model would struggle. In grass hockey, the model would struggle with sticks, and the list goes on.

Worst-case scenario, completely different sports, such as polo or water polo, due to it being in completely different environments than football and having different/additional elements and complex mechanics.

In conclusion, the proposals can be scaled to other team-based sports granted that we accept worse performance or retrain and fine-tune the model with appropriate data for each sport.