Volleyball Vision

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Introduction

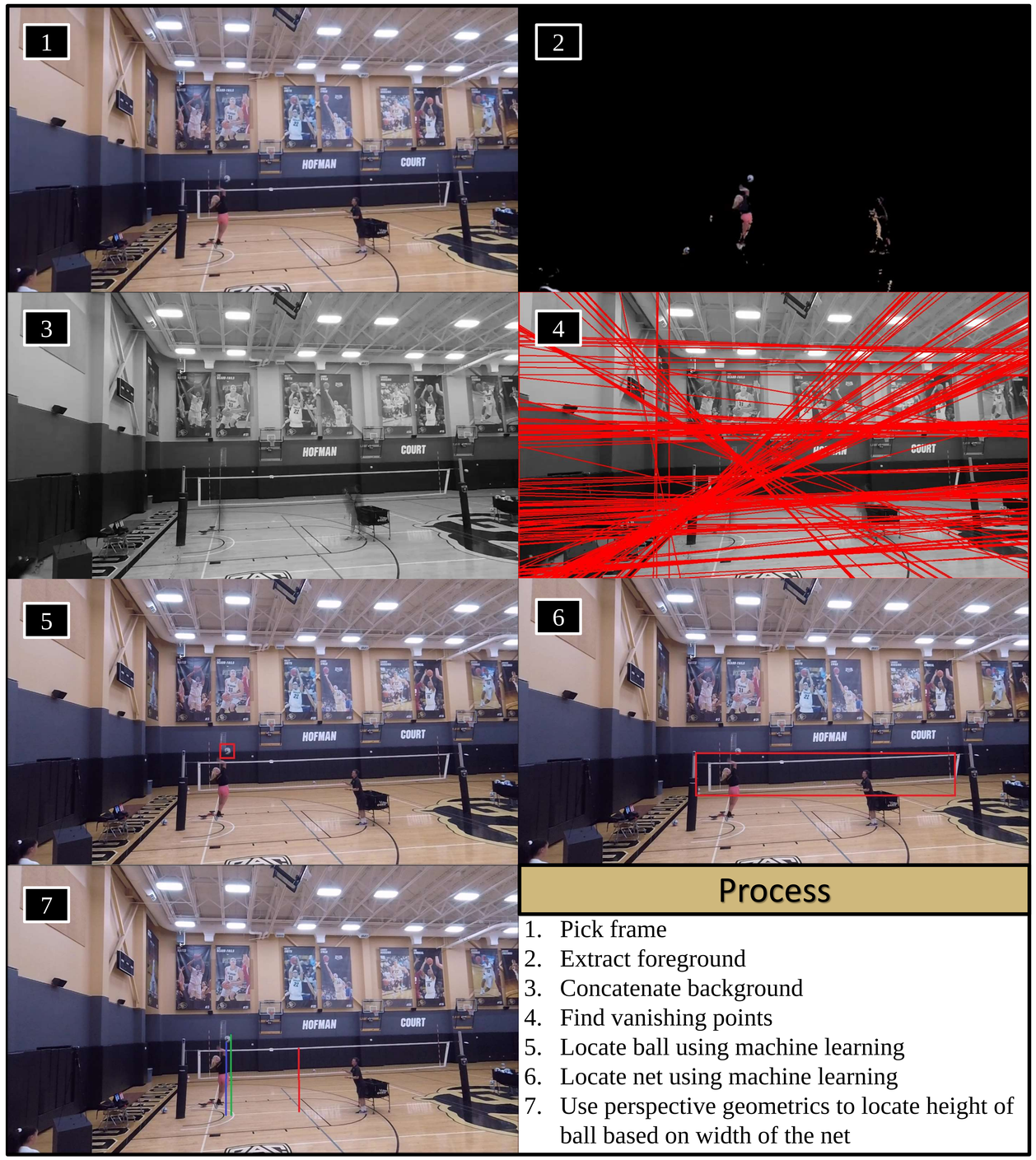
Volleyball vision is a video processing project built to analyze volleyball players.

Aspects of this project include:
- Computer vision
- Machine learning
- Perspective geometry
- Statistics

The goals of this program are to:
- Estimate ball height within one centimeter of actual ball height
- Estimate the ball height for each frame in a three to five second clip
- Build a three-dimensional model of the ball trajectory during the clip
- Bound the trajectory within a certain confidence interval

Purpose

This project intends to create a platform that coaches can use for recruiting and quick player evaluation. In a simple and cost-effective manor, coaches can take a short video with their smartphone and view statistics about ball trajectory and player height. This will allow college coaches and scouts to get instant feedback with statistics while they are on the road recruiting.



Process

1. Pick frame
2. Extract foreground
3. Concatenate background
4. Find vanishing points
5. Locate ball using machine learning
6. Locate net using machine learning
7. Use perspective geometrics to locate height of ball based on width of the net

Results

After the first round of testing on a single frame, the best estimated height of the ball was within 0.75 centimeters of the actual height. The source of this video was 1280 pixels by 720 pixels.

Potential sources of errors:
- Accuracy of vanishing point location based on the clustering algorithm
- Resolution of input video leading to inaccurate actual pixel locations

Future

The next steps in the software development process are:

- Testing third dimensional accuracy
- Visual modeling of the ball trajectory
- Addition of advanced play statistics such as velocity of ball
- Set up a server structured for processing and submitting clips
- Develop a user interface

References

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More information can be found at: https://github.com/bakerscott/VB-Research