

# VIDEO-BASED ANALYSIS OF TENNIS MATCHES

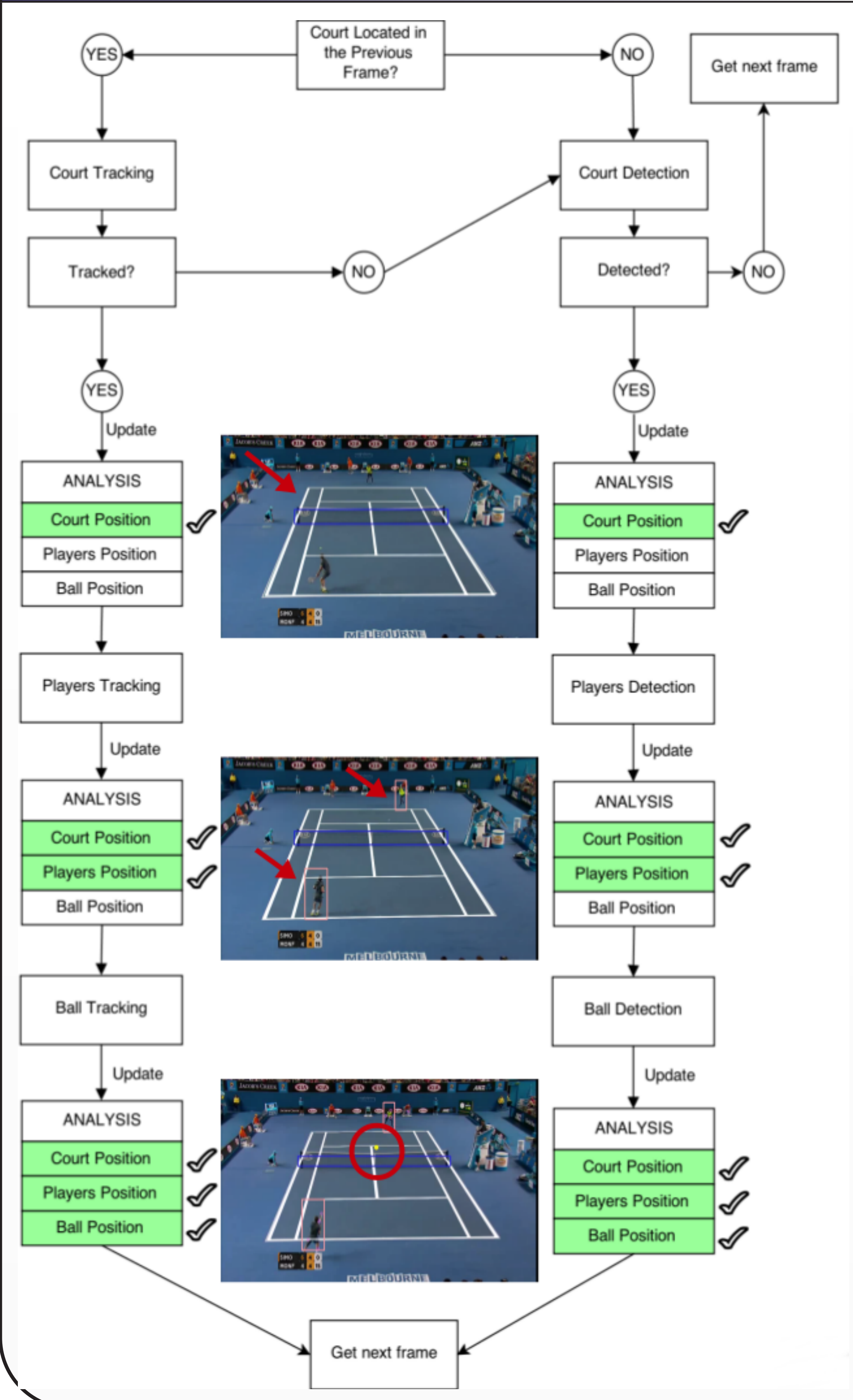
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## Abstract

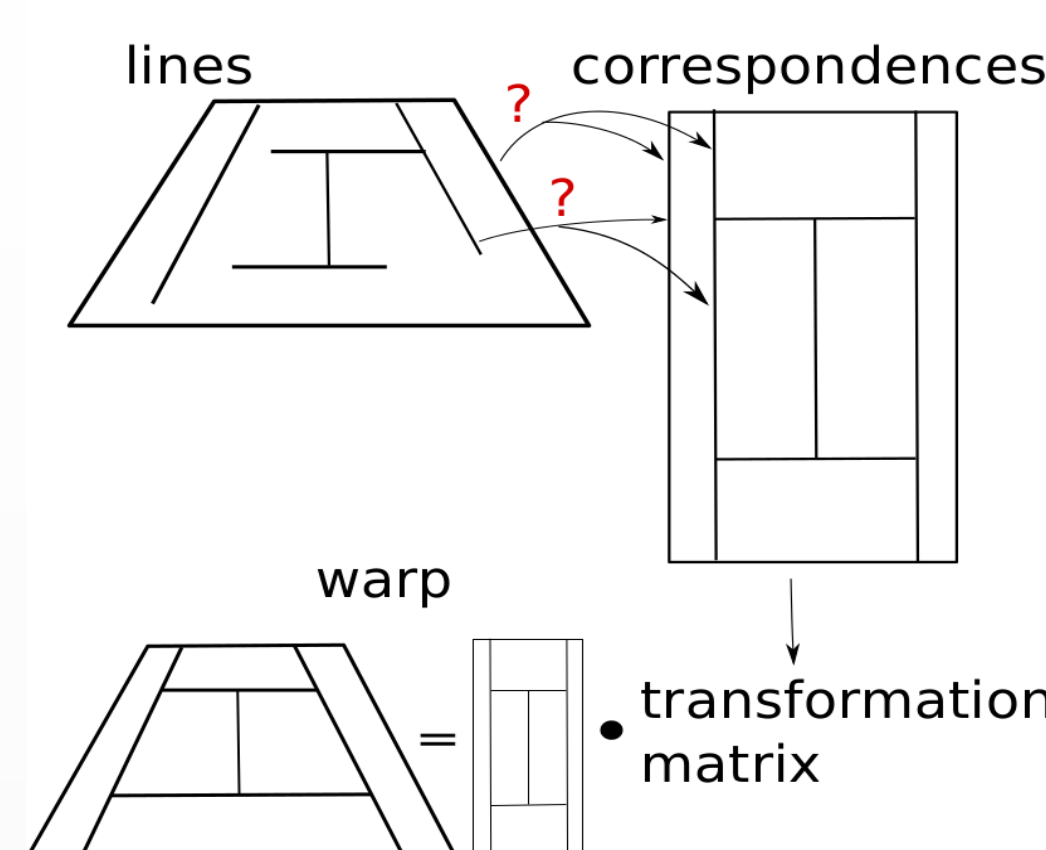
Most of the current tennis models are based on player's statistics, such as the points won in the first serve, second serve etc. Our study goes a step further by analysing and modelling the evolution of a single point based on visually-extracted information. The first step in achieving this is the detection and tracking of the different elements of a tennis match (court, players and ball). Some of the challenges that have to be overcome include scene occlusions, camera movements and the small size of the ball. The system presented here is able to detect all the elements in a variety of tennis broadcast videos (eg. different surfaces) and produce annotated tennis videos. In addition to this, and different from current work, our annotated tennis videos also contain a bar showing the accuracy of the court detection and a projection of the players' positions in a virtual court.

## Overview



## Court Detection

### 1. Find the court



### 2. Calculate accuracy

### 3. Find the net

### Result

The court detection works with

- partial view of the court
- scenes with occlusion

### Relevance

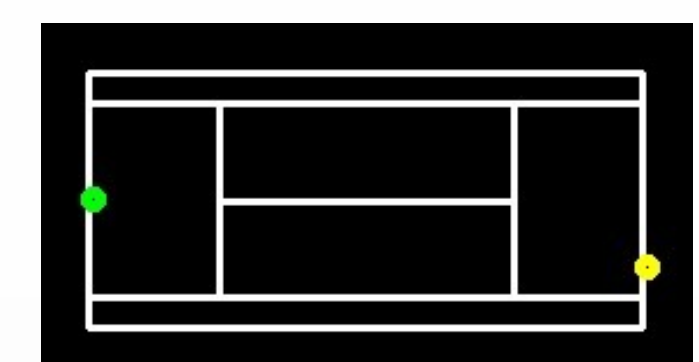
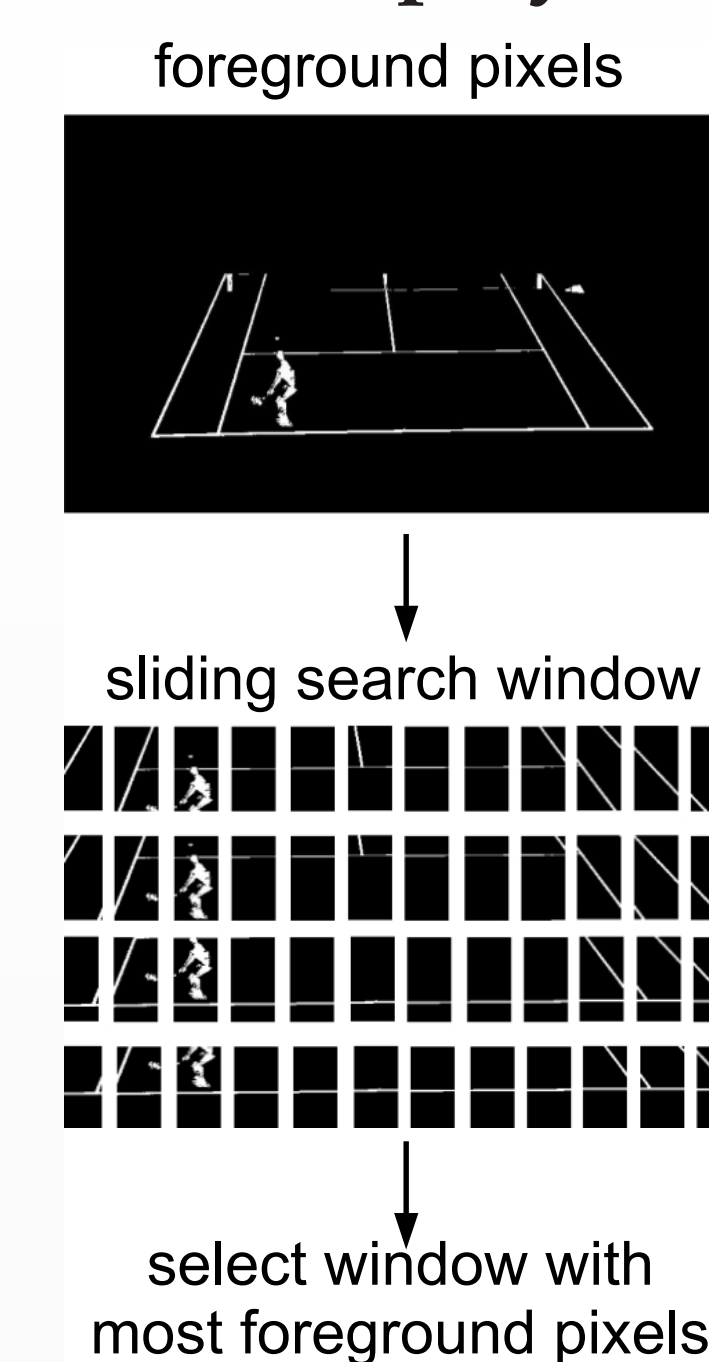
The court detection helps to

- compensate camera movement
- understand the real position of the elements

## Players Detection

### 2. Determine their position within the court

### 1. Find the players



### Player Detection Accuracy

Surface	Player1	Player2
Hard court	100%	100%
Hard court	80%	95.5%
Hard court	89.2%	97.6%
Grass	100%	100%
Grass	91.3%	92.4%

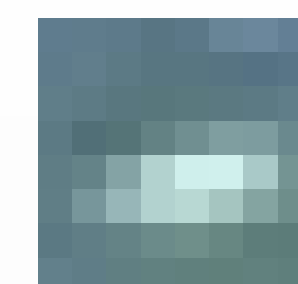
Next... determine the posture of the player

## Future work

- Classify players' actions
- Estimate the ball's position in the real world
- Determine phase of play
- Develop a model of the dynamic of winning a tennis point

## Ball Detection

### Challenge



- Ball is small in size
- Deforms in shape

### Implementation

1. Background subtraction (frame differencing)
2. Find ball candidates (blob detection)
3. Select best candidate based on:
  - Previous ball position
  - HSV histogram