

SoccER Dataset - Description

The SoccER (Soccer Event Recognition) Dataset was created through a Computer Graphics simulation engine in order to allow the recognition and detection of a wide range of complex events from positional data.

This repository contains the dataset described and generated for the paper:

- Morra Lia, Manigrasso Francesco, Canto Giuseppe, Gianfrate Claudio, Guarino Enrico, Lamberti Fabrizio: "Slicing and dicing soccer: automatic detection of complex events from spatio-temporal data", Proc. 17th International Conference on Image Analysis and Recognition (ICIAR 2020).

A detailed description of the type of events and how they were annotated is available in the above mentioned paper.

The synthetic dataset has been generated by adapting the opensource Gameplay Football game; the code is available at

Insert gitlab link here

Each zip files contain the files for one game, which has been generated in one of three modalities: player vs. player, player vs. AI, or AI vs. AI.

Structure of the data

Each directory contains the following files:

- Annotations_AtomicEvents_firstHalf: contains the annotation of atomic events exported from the game engine in xml format
- Annotations_AtomicEvents_Cvat_firstHalf: contains the annotation of atomic events in a format compatible with the CVAT annotation tool¹
- Annotations_AtomicEvents_Manual_firstHalf: contains additional annotations related to the goal keeper
- Annotations_AtomicEvents_ComplexEvents_firstHalf: contains the annotation of complex events exported from the game engine in xml format
- positions.log: contains the position information for each player and the ball
- Recording.mvk: video recording of the game
- features.log (not available for all games): features extracted from the player and ball positions
- Textual annotation.txt: annotations of atomic events exported in plain text format.

Annotation of atomic events

The following events are available in the annotations

¹ <https://github.com/opencv/cvat>

- KickingTheBall
- BallPossession
- Tackle
- BallDeflection
- BallOut
- Goal
- Foul
- Penalty

Each event is associated an event id, a label, a time reference (the frame in which they were identified), a player and a team id.

```
<track id="168741" label="KickingTheBall">
  <box frame="281161" keyframe="1" occluded="0" outside="0"
    xbr="1.2415799999999993e+03"
    xtl="1.2005299999999997e+03"
    ybr="1.68740000000000009e+02"
    ytl="9.17900000000000063e+01">
    <attribute name="playerId">47</attribute>
    <attribute name="teamId">0</attribute>
    <attribute name="x">54.9629</attribute>
    <attribute name="y">35.7232</attribute>
  </box>
</track>
```

Figure 1 - Example of annotation format for a single atomic event

Annotation of complex events

The following events are available in the annotations:

- Pass
- PassThenGoal
- FilteringPass
- FilteringPassThenGoal
- Cross
- CrossThenGoal
- Tackle

- SlidingTackle
- Shot
- ShotOut
- ShotThenGoal
- SavedShot

The events are automatically labelled based on the state of the players and balls during the simulation game. As an example, Figure 2 represents the finite state machines that generates event for the pass family.

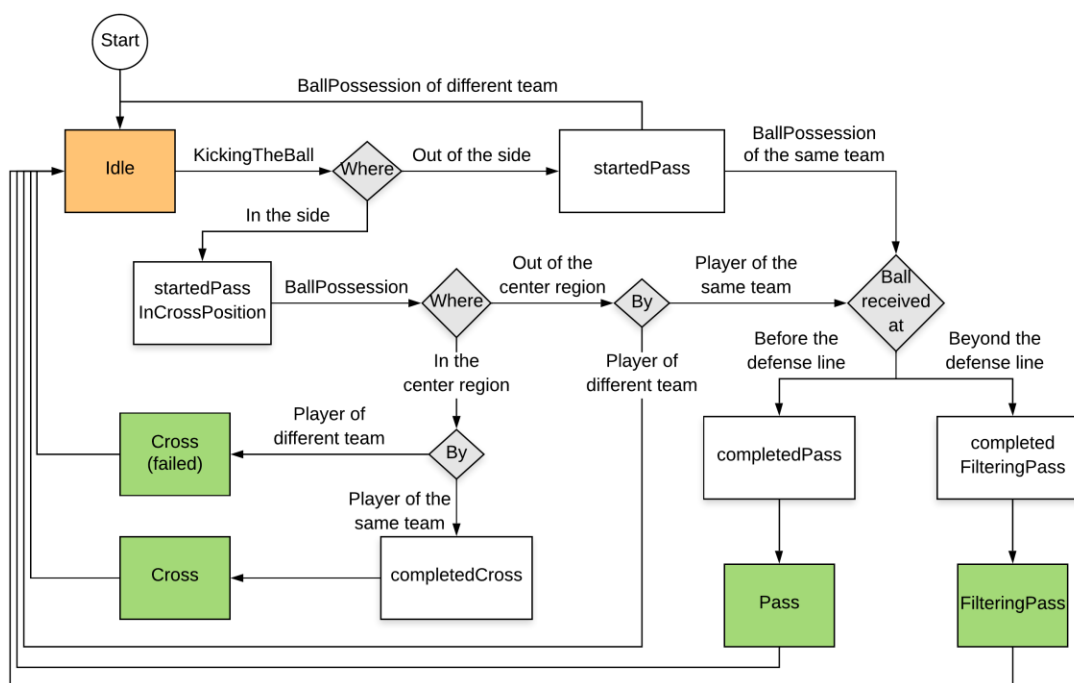


Figure 2 – Finite state machine for the automatic generation of the pass, filtering pass and cross events

For compatibility with the CVAT annotation format, each complex event is represented by a track that covers a series of frames (also denoted as “box” in the xml format). The position of the bounding box are fictious and only inserted for compatibility with CVAT. Each complex event is associated a label and a series of attributes that characterize the players that are involved in the event. In the example in Figure 3, a cross event is associated with two players (sender and receiver) from a team (which is the same for both players) and a binary outcome (successful/failed cross).

```

<track id="545" label="Cross">
  <box frame="212757" keyframe="1" occluded="0" outside="0"
    xbr="1.2415799999999993e+03"
    xtl="1.2005299999999997e+03"
    ybr="1.6874000000000009e+02"
    ytl="9.1790000000000063e+01">

    <attribute name="sender">66</attribute>
    <attribute name="teamId">1</attribute>
    <attribute name="receiver">41</attribute>
    <attribute name="outcome">>false</attribute>
  </box>
  <box>
    ...
  </box>
  <box frame="212835" keyframe="0" occluded="0" outside="0"
    xbr="1.2415799999999993e+03"
    xtl="1.2005299999999997e+03"
    ybr="1.6874000000000009e+02"
    ytl="9.1790000000000063e+01">

    <attribute name="sender">66</attribute>
    <attribute name="teamId">1</attribute>
    <attribute name="receiver">41</attribute>
    <attribute name="outcome">>false</attribute>
  </box>
</track>

```

Figure 3 - Example of annotation format for a single complex event

Positions

The positions.log file contains the position, frame by frame, of all players and of the ball throughout the duration of the game.

The format used is the following:

#frame ID x_pos y_pos

where #frame is an integer, #ID is an integer which is equal to 128 in the case of the ball, greater than 128 if it is a player of team A, otherwise less than 128 if it is a player of team B. Finally x_pos and y_pos represent the coordinates of the position of the player or ball in a range of [0, 0] to [110, 72].

Video recording

The video was recorded using the OBS studio software. The video captured from the game window was captured with the following settings:

- Video resolution: 1920 x 1080 px (Full HD)
- Framerate: 25 fps
- Bitrate: high (high quality)
- Audio sampling: 44.1 KHz

Contributors and contacts

If you make use of these datasets in your research, please cite the following paper:

@inproceedings{

title={Slicing and dicing soccer: automatic detection of complex events from spatio-temporal data},

author={Morra, Lia and Manigrasso, Francesco and Canto, Giuseppe and Gianfrate, Claudio and Guarino, Enrico and Lamberti, Fabrizio},

booktitle={Proc. 17th International Conference on Image Analysis and Recognition (ICIAR 2020)},

year={2020},

publisher={Springer}

}

Contributors to this work include: Lia Morra, Francesco Manigrasso, Giuseppe Canto, Claudio Gianfrate, Enrico Guarino, and Fabrizio Lamberti.

For information about the project, please contact Lia Morra or Fabrizio Lamberti (name.surname@polito.it).