



# Automatic Dribbling Action Recognition in a Sports Game

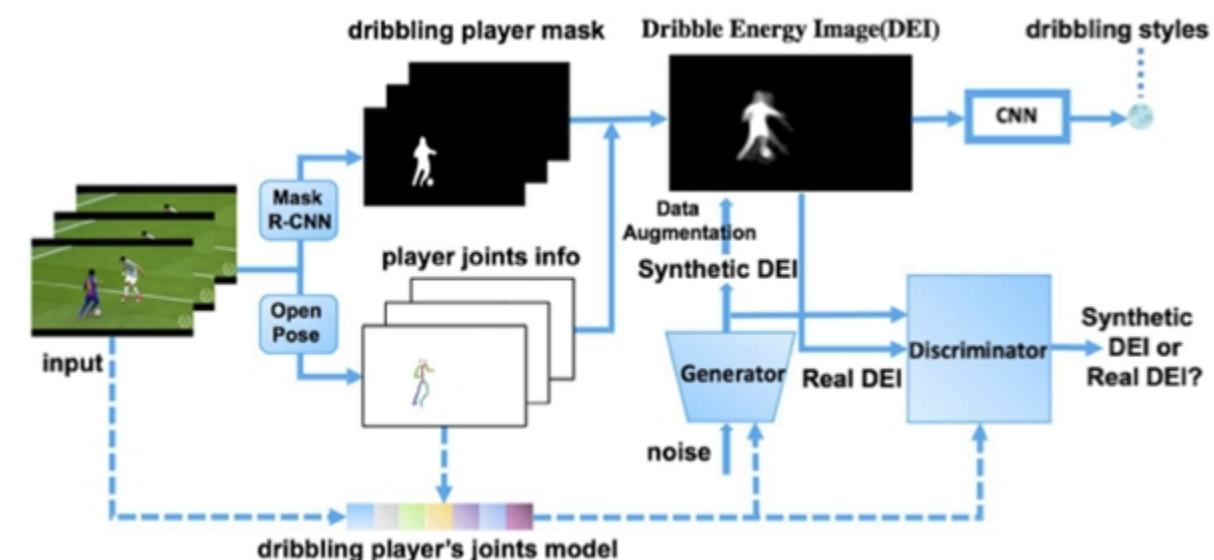
Tech ID: 31902 / UC Case 2019-762-0

## BACKGROUND

The booming popularity and business value of soccer, worldwide, is driving deeper analysis to obtain precise and elaborate statistics of every soccer player and match. Investigating dribbling skills is beneficial to both train players and to improve defending skills. Dribbling styles can be broadly classified as Stepover, Elastico and Chop. For analysis, in addition to the lack of labeled data in soccer videos there is a lack of fine-grained dribbling styles classification. Additional challenges include the camera calibration, camera motion as a result of player speeds and image registration.

## BRIEF DESCRIPTION

Researchers led by Prof. Bir Bhanu at UCR have designed a patent pending system to automate the classification and analysis of player dribbling styles using an assembled dataset of soccer videos from various sources.



Architecture for the classification of soccer dribbling styles.

## FEATURES/BENEFITS

The inventors have:

- ▶ Collected and built up a soccer dribbling dataset.
- ▶ Introduced a Dribble Energy Image (DEI) based image registration method which can handle raw video clips at multi-scale camera resolutions and solves camera motion challenges.
- ▶ Developed a classification of dribbling styles using Convolutional Neural Network (CNN) and Generative Adversarial Network (GAN) to augment and improve classification performance.
- ▶ Constructed a player joints model to train Conditional GAN to generate DEI.

## STATE OF DEVELOPMENT

## CONTACT

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## OTHER INFORMATION

### KEYWORDS

computer automated analytics,  
computer vision, convolutional neural  
networks, soccer

### CATEGORIZED AS

- ▶ **Computer**
- ▶ Software
- ▶ **Imaging**
- ▶ Software

### RELATED CASES

2019-762-0, 2018-549-0

The team have built and tested the prototype on datasets from the top 5 European leagues as well as on synthetic games such as FIFA on Xbox and Playstation. The achieved accuracy of dribbling style classification is 89.83%.

## APPLICATIONS

- ▶ Video analytics in sports
- ▶ Talent identification in sports
- ▶ Player development in sports
- ▶ Game strategy development in Soccer

## PATENT STATUS

| Country                  | Type          | Number     | Dated      | Case     |
|--------------------------|---------------|------------|------------|----------|
| United States Of America | Issued Patent | 11,544,928 | 01/03/2023 | 2019-762 |

## RELATED MATERIALS

- ▶ [Fine-grained Visual Dribbling Style Analysis for Soccer Videos with Augmented Dribble Energy Image](#)

## RELATED TECHNOLOGIES

[Additional Inventions by Bir Bhanu](#)

## RELATED TECHNOLOGIES

- ▶ [Generating Visual Analytics And Player Statistics For Soccer](#)

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