ARTHuS - Adaptive Real-Time Human Segmentation in sports through online distillation
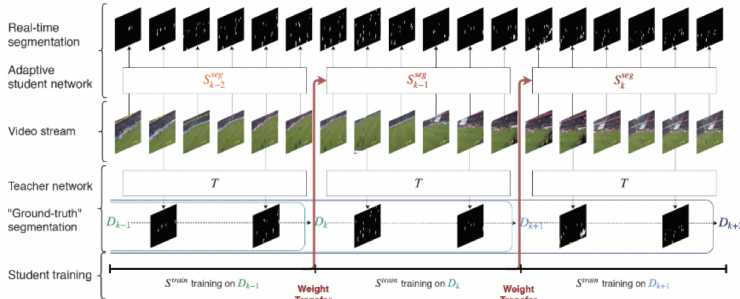

ARTHuS method : a real-time student segmentation network Sseg segments each frame of the video stream while its duplicate Strain continuously trains to mimic a slow but effective teacher segmentation network T. The weights of Strain are periodically copied into Sseg, which is thus consistently adapted to the latest match conditions and becomes match-specific.

ARTHuS was developed by A. Cioppa and and Prof. M. Van Droogenbroeck from Montefiore Institute, Department of Electrical Engineering and Computer Science of the University of Liège.

Semantic segmentation can be regarded as a useful tool for global scene understanding in many areas, including sports, but has inherent difficulties, such as the need for pixel-wise annotated training data and the absence of well-performing real-time universal algorithms.

To alleviate these issues, we sacrifice universality by developing a general method, named ARTHuS, that produces adaptive real-time game-specific networks for human segmentation in sports videos, without requiring any manual annotation. This is done by an online knowledge distillation process, in which a fast student network is trained to mimic the output of an existing slow but effective universal teacher network, while being periodically updated to adjust to the latest play conditions.

As a result, ARTHuS allows to build highly effective real-time human segmentation networks that evolve through the match and that sometimes outperform their teacher.

INTELLECTUAL PROPERTY

The python source code is available under the GNU Affero General Public License v3.0.
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KEY ACHIEVEMENTS

- ARTHuS is a technique to build adaptive real-time match-specific networks for human segmentation, without requiring any manual annotation.
- Highly effective real-time human segmentation network that evolves over time.
- The usefulness of producing adaptive game-specific networks and their excellent performances are demonstrated quantitatively and qualitatively for soccer and basketball games.

KEY COMPETITIVE ADVANTAGES

- Human segmentation, without requiring any manual annotation.
- Effectiveness of the method quantitatively and qualitatively on soccer and basketball matches.
- Match-specific networks outperforming fixed pre-trained sports-specific networks and their teacher on some occasions.

PARTNERSHIP SOUGHT

Companies developing molecular tools to follow HTLV-1 infection.

Wallonie