

# AI in Production: Video Analysis and Machine Learning for Expanded Live Events Coverage

JACK ALLNUTT, ROSIE CAMPBELL, MICHAEL EVANS, RONAN FOREMAN, JAMES GIBSON, STEPHEN JOLLY, LIANNE KERLIN, GRAEME PHILLIPSON, and EM SHOTTON, BBC Research & Development, United Kingdom

SUSAN LEHELDT, University of Edinburgh, United Kingdom

As with many industries, TV and video production is likely to be transformed by artificial intelligence (AI) and machine learning (ML), with software and algorithms assisting production tasks that, conventionally, could only be carried out by people. Expanded coverage of a diverse range of live events is particularly constrained by the relative scarcity of skilled people, and it is a strong use case for AI-based automation.

This article describes the recent research conducted by the British Broadcasting Corporation (BBC) on the potential production benefits of AI algorithms, using visual analysis and other techniques. Rigging small, static ultra high-definition (UHD) cameras, we have enabled a one-person crew to crop UHD footage in multiple ways and cut between the resulting shots, effectively creating multicamera HD coverage of events that cannot accommodate a camera crew.

By working with programme-makers to develop simple deterministic rules and, increasingly, training systems using advanced video analysis, we are developing a system of algorithms to automatically frame, sequence, and select shots, and construct acceptable multicamera coverage of previously untelevised types of events.

This paper was published in the proceedings of the International Broadcasting Convention in 2018 [1], and in SMPTE Motion Imaging Journal in 2020 [2].

Additional Key Words and Phrases: broadcast technology, intelligent cinematography, broadcasting, user evaluation

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## 1 OVERVIEW

Artificial Intelligence (AI) and Machine Learning (ML) have the potential to increase substantially the range and scale of events that broadcasters and other content producers can cover. It is not clear what the timescale and impact of these technologies will be, or the extent to which they will assist existing human craft roles rather than automate parts of them.

In this paper, we present our first efforts to investigate these opportunities. Our recent work to simplify the process of covering staged events such as stand-up comedy or panel shows using new software tools and novel craft workflow is described: the BBC prototypes Primer and SOMA use web technologies and our IP Studio implementation of the AMWA NMOS standards to allow a single operator to produce “nearly live” coverage of such performances.

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Authors' addresses: Jack Allnutt; Rosie Campbell; Michael Evans, [michael.evans@bbc.co.uk](mailto:michael.evans@bbc.co.uk); Ronan Foreman; James Gibson; Stephen Jolly, [stephen.jolly@bbc.co.uk](mailto:stephen.jolly@bbc.co.uk); Lianne Kerlin; Graeme Phillipson; Em Shotton, BBC Research & Development, Salford, United Kingdom; Susan Lechelt, University of Edinburgh, Edinburgh, United Kingdom.

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We then describe our experiences in developing Ed, a system that attempts to automate the work of this craftsperson using a rules-based AI approach. The challenges associated with evaluating the performance of such a system are discussed, as well as the prospects for improving it using ML.

Our objective in developing automation for a specific production workflow is to learn where the limitations of AI lie, in the expectation that our industry will benefit most from AI and ML in the short term by using these technologies to make people more effective—automating their most time-consuming or repetitive tasks—rather than by supplanting them.

## REFERENCES

- [1] Jack Allnutt, Rosie Campbell, Michael Evans, Ronan Forman, James Gibson, Stephen Jolly, Lianne Kerlin, Susan Lechelt, Graeme Phillipson, and Em Shotton. 2018. AI in Production: Video Analysis and Machine Learning for Expanded Live Events Coverage. In *International Broadcasting Convention*. <https://www.ibt.org/2018/3312.article>
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