Creating an Outside Broadcast of a Marathon

Martin Flintham
Horizon Digital Economy Research
Nottingham Geospatial Building
University of Nottingham
+44 115 748 4041

mdf@cs.nott.ac.uk

Stuart Reeves
Horizon Digital Economy Research
Nottingham Geospatial Building
University of Nottingham
+44 115 748 4041

stuart@tropic.org.uk

Abigail Durrant
Horizon Digital Economy Research
Nottingham Geospatial Building
University of Nottingham
+44 115 748 4041

abigail.durrant@nott.ac.uk

ABSTRACT

Outside broadcasting is the production of television of radio programmes away from a purpose built studio, and is typically used to record and broadcast live events such as sports, festivals and breaking news, generally by a team of trained professionals utilizing a complex and expensive pool of equipment. This paper describes ongoing work within the Horizon Hub to develop a prototype service that allows grass-roots outside broadcasts to be crowd-sourced from video streams provided by spectators at the event, and to be viewed live online.

Keywords

Mobile computing, outside broadcast, mobile television, video streaming, marathon, spectating

1.   INTRODUCTION

While there is a longstanding tradition of national broadcasters covering major events from the London Marathon to Glastonbury, it is not currently economically feasible to extend this to the very many similar but much smaller-scale events that take place across the country; the person-power and equipment involved in traditional outside broadcasting is often simply overwhelming for small-scale events. Moreover, the traditionally somewhat rigid outside broadcasting model of a dedicated team of camera operators, producers and editors broadcasting to a passive or non-interactive audience arguably results in a "lowest common denominator" experience that is less able to take into account an individual audience member's interest, quickly adapt to changing circumstances at an event, or provide significant coverage of a geographically large setting. We believe that what is needed is a radical new kind of service that is quick and lightweight to deploy and that can be delivered by and to local communities.

We propose an approach in which video streams are captured by and transmitted from spectators' own devices, such as mobile phones to be made available over the Internet for others to see. The dramatic increase in smart-phone ownership has lead to an explosion of media capture by individuals, with people capturing their own footage of everyday situations to share with others through social networks and dedicated media sharing sites. We believe that this resource of amateur and ad-hoc video capture and sharing can be exploited and importantly structured to take the

role of an expensive professional production crew.

While existing services provide the ability for users to broadcast and share video of an event, there is little support for structuring the footage from multiple mobile broadcasters in a manner that provides a coherent overview of the entire event, as opposed to the point of view or interest of individual camera operators. Online viewers are traditionally limited to browsing by tags, ratings or "nearby" video streams – sharply contrasting with the "story" presented by professional broadcasting.

Building on previous work [2], this paper describes the ongoing development of a prototype service that enables a crowd of "active" spectators [1] at an event to broadcast live video from their mobile devices, but now with a view to contributing to an outside broadcast of the event for consumption by online viewers. We aim to make use of social networking, recommender systems and location-based services that select and recommend streams of likely interest to viewers, and also guide mobile camera operators as to where to go to capture the best footage. The net result is a form of crowd-sourced outside broadcast – somewhat like a 'live' YouTube, but with additional coordination and direction services, and the ability to select from many live video streams.

In particular, we seek to answer the following questions:

- Can a crowd of spectators create a sufficient number of usable video streams, and how can these be presented to online viewers in a coherent manner? How can the personal needs and interests of an individual spectator be balanced with the needs of the broadcast as a whole?

- How can the sensing capabilities of modern smart-phones (GPS, accelerometers etc) provide meaningful and timely meta-data to inform the online viewing experience, and how can the online audience usefully provide feedback and direction to the crowd of camera operators?

2.   BROADCASTING THE MARATHON

The Robin Hood half-marathon is an annual 13 mile race that attracts thousands of runners each year, from dedicated experts, to amateurs, to those running for charity of the personal challenge. The run follows a known and predictable route through the city along which spectators can gather to watch and passing local houses and offices at key points. We are using this year's marathon as a case study of an initial deployment of our prototype service, illustrated in figures 1 and 2.

2.1   Active Spectators

In our scenario, members of the crowd of spectators lining the route of the marathon are invited to volunteer to be camera operators using their own mobile devices with a dedicated app installed. Some of these may be filming from key vantage points along the route, while others may be looking out for family and

friends taking part in the marathon to follow and film. The live video is streamed online, but the app also continuously reports live meta-data alongside the video captured from the mobile phone's sensors, particularly position, orientation and accelerometer readings.

Each mobile camera operator receives feedback from the online audience, in the form of an indication of how many people are currently watching the feed, but also live direction in the form of text messages either from the audience or from the system, suggesting where they may like to film next. Ultimately this aims to guide the camera operators as to where to go in order to fill gaps in coverage as the marathon progresses.

2.2 Instrumented Runners

Members of the public taking part in the marathon may also volunteer to carry a mobile phone and take part in the broadcast. They can choose to broadcast their progress along the course in the same way as the spectators, but in this case the phone primarily acts to stream meta-data reporting position and orientation – enabling online viewers to easily follow progress.

2.3 Online Viewers

Online, a dedicated browser interface (figure 2) aims to provide viewers with an engaging experience of the ongoing marathon by allowing them to watch the incoming live video streams from mobile camera operators. Specifically, the interface presents viewers with an appropriately filtered selection of the live video streams that can be explored to discover new points of view, to follow specific positions or participants, or to interactively create a new narrative cut through the collection of video. We aim to explore the use of a number of interface components to support this activity.

A map displays the route of the marathon, annotated with the positions of currently active mobile broadcasters and instrumented participants. Clicking on each position begins to stream the associated video, and allows the viewer to communicate with the mobile broadcaster via short text messages. This map interface allows the viewer to browse the event spatially, perhaps choosing to focus on particular places of interest.

Alternatively, the viewer can select to follow one of the instrumented runners, perhaps to follow the progress of a friend.

In this case, the system will automatically switch to the nearest broadcasting camera along the route. Ultimately we hope to introduce a more intelligent system for selecting cameras that takes into account elements of the terrain, and line of sight.

Finally, the viewer can browse the collection of live video feeds based on meta-data aggregated from other online viewers, for example the most popular based on concurrent viewers, or most active in terms of viewer direction. Used concurrently, ideally these three interfaces will enable viewers to unearth interesting or particularly high-quality elements captured to bubble to the surface of the broadcast.

3. PROTOTYPE DEPLOYMENT

Our prototype is built as a secondary system that sits alongside and compliments an existing mobile video broadcasting infrastructure, Bambuser[1], and the mobile client takes the form of a background service to broadcast relevant meta-data and to receive feedback and direction. Initially the mobile client targets the Android platform, while the service itself is hosted on the Google App Engine cloud platform.

We aim to deploy our initial prototype at the upcoming Robin Hood Marathon in September, primarily to document and understand the use of the fundamental features of the system by the general public, and to test the feasibility of creating an engaging online experience from crowd-sourced mobile video streams. Ultimately we envisage making the service available as a platform, enabling the public to create their own broadcasts of events of their choice.

4. ACKNOWLEDGMENTS

5. REFERENCES

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[1] www.bambuser.com