



Gmax Race Post-race Feed Specification

Will Bradley

10th July 2017

- The Gmax Race system tracks race horses during real-time. Its minimal infrastructure makes it easy and economical to use.
- The system is not intended to replace the information that can be readily observed by viewers from live TV pictures, commentary or photo finish systems. It is intended to complement those systems by providing greater insight into the progress of the race, particularly where views from cameras or the grandstand may be less clear.
- Various data feeds are available. This document describes the protocol for a 'Post Race' feed, which provides a summary of the race by 'section' measured for each horse after the race is complete. It is intended for post-race analysis and to aid form estimation for future races.
- Our system is under active development. Feedback on possible future improvements is welcome.

- Each time a horse passes a 'Gate' (for example, a particular distance from the finish line), the Gmax Race system generates a message with the following parameters:

Description	Name	Type	Example	Notes
Unique Horse/Race Identifier	I	String	3020160112131004	String containing numeric identifiers for racecourse, date, race start time and horse
Gate Name	G	String	1f	String identifying the Gate in question.
Sectional Time	S	Number	10.6	Sectional time in seconds between the current Gate and the previous Gate
Running Time	R	Number	46.7	The total time between the start of the race and when the horse passed this Gate
Distance Back	B	Number	1.5	Estimated distance in meters from the leading horse at this Gate to the current horse
Distance Ran	D	Number	202.6	Length of the path in that section (distance travelled)
Number of Strides	N	Number	28.7	Estimated number of strides made by the horse during this section

- For each race, the data is provided as a ECMA-404 JSON array, with each item in the array formatted as in the example below:

```
{"I": "3020160112131004", "G": "1f", "S": 10.6, "R": 46.7, "B": 1.5, "D": 202.6, "N": 28.7}
```

- A message will be output for every Gate/Horse that is successfully tracked
- The data for a particular can be requested using http from the following URL by providing the 'Sharecode' – the unique identifier for each race, and your subscriber license key. E.g.:

[http://www.gmaxequine.com/TPD/client/sectionals.ashx?Sharecode=30201601121310&k=\[license key\]](http://www.gmaxequine.com/TPD/client/sectionals.ashx?Sharecode=30201601121310&k=[license key])

- Format
 - JSON has been selected due to its very wide usage, simplicity and efficiency
- Horse identifier
 - This is composed as follows:
[2-digit racecourse ID][race scheduled start date/time: YYYYMMddHHmm][2-digit racecard horse number]
 - The former part (ignoring horse number) provides a unique race identifier, which is the same as that provided as the 'Sharecode' when requesting the feed.
 - The racecourse ID matches that provided by Weatherbys for race card data. E.g. '30' = Lingfield Park
 - Note that racecourse identifier is currently under review, the intention is to change to use a larger field so that a unique ID can be used globally.
- Resolution/Accuracy
 - Current 1-sigma sectional timing accuracy is estimated to be approx. $\pm 0.1s$, the accuracy can be considered to be normally distributed
 - Although available with a higher level of resolution, at this time we consider that the accuracy justifies the display of no more than one decimal place.
 - Run time is provided separately. Note that it may not always be identical to the sum of sectional times, due to the rounding of each time to one decimal place (hence the reason it is provided separately). E.g. $10.55 + 11.55 = 22.1$; but $10.6 + 11.6 = 22.2$
 - Distance back an estimate of what the distance between the horse in question and the leading horse was when the horses are equally spaced (in time) either side of the Gate.
- Stride count/frequency/length
 - Stride count can be readily used by the client in combination with sectional time and distance ran to calculate average stride length and frequency over the section
- Usage
 - For best efficiency and scalability, we request that the data from this feed is cached by subscribers who are expecting a large number of requests from end users (e.g. consumers using your website or mobile apps). We reserve the right to impose 'fair usage' limits on repetitive requests for the same data.

- At the finish the Gmax Race System corrects the Running Time (where necessary) to match official finish times. However, note that finish time is not necessarily the same as the official race result, since horses may be penalised for infringement of the rules.
- Although the Running Time for each horse at each previous Gate allows for a straightforward estimate of race order at that point, we recommend careful consideration of the accuracy of the system in the way in which this is presented to the user. i.e. sometimes the race order inferred from these times may not be correct.
- Instead, the data can be presented to give the user a clear indication of the distribution of the field, without necessarily providing exact information on the position of every horse.
- Examples of the presentation of this data include:
 - www.gmaxequine.com/tpd/public/sectionals.aspx
 - <http://www.attheraces.com/racecard/Lingfield/14-April-2017/1610/> (click on sectional times/tools tabs)

- The Gmax Race system will attempt to maintain the feed as reliably as possible. However, we advise end users to consider the following failure modes, some of which may be beyond Gmax's control

Failure Mode	Likely Effect on data feed
System wide failure – for example, due to failure on the base station, the racecourse network, radio jamming etc.	Complete data may not be available for that race
Tracker issued, but horse does not carry it*	Data will not appear for that horse
Tracker is physically damaged	Some sectional times for that horse may be missing/incorrect
Tracker is carried on the wrong horse	Data will appear as normal, but the error may be apparent with reference to other information (such as TV images, official results etc)

*Note that this would be in contravention of BHA rules, and serious penalties may be applied to trainers caught so doing – it should therefore be unlikely to occur.

- Subscribers to this feed will be kept informed of updates, and as far as possible this will be introduced by extending the data feed described herein to ensure backward compatibility. End users should design their applications to be tolerant to additional JSON messages/objects appearing in the data in future, such extensions may be implemented without notice.
- Consultation is currently underway on improvements to the horse/racecourse identifier, to provide better support for operations globally. This will result in an increased size of racecourse identifier, and possibly the splitting of the current identifier into separate parameters.

The following additional data may be available in the feed in future:

- Derived kinematic measurements, such as:
 - Speed
 - Acceleration
 - Race order
 - Position of horse in race
- Distance from the rail
- Heart rate

- In future we may also consider transport layer encryption.

The background of the image is a hazy, golden-hour scene of a horse race track. In the foreground, a grassy field is visible. In the middle ground, a group of riders on horses is silhouetted against the bright, hazy sky. The riders are scattered across the track, some appearing to be in motion. In the background, a line of spectators is visible, and several tall, thin poles with rectangular signs are spaced along the track. The overall atmosphere is misty and serene, with a warm, golden light.

Gmax

Gmax Technology Ltd., Church Road, Toft, Cambridge, UK
Phone: +44 1223 264428 Email: info@gmaxequine.com