Covid-19 Modelling Results, as at 11 April 2020

CANADA
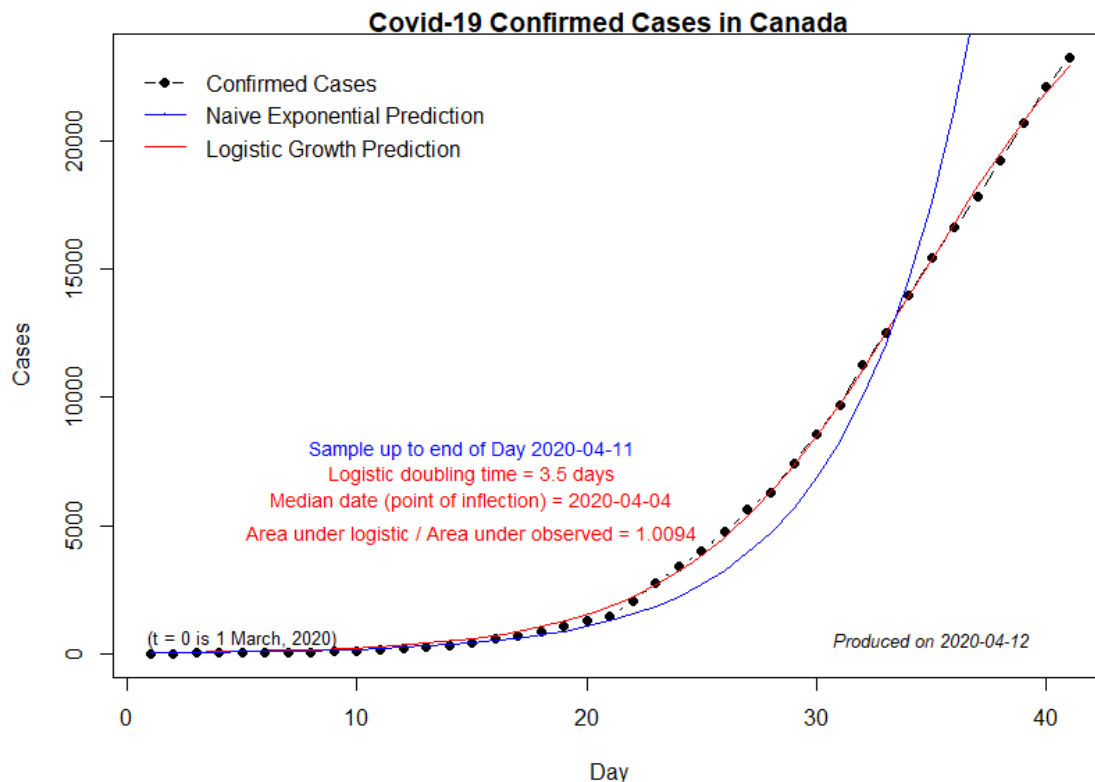
1. Total Confirmed Cases

My R code for Covid-19 modelling is at

https://raw.githubusercontent.com/DaveGiles1949/r-code/master/Canadian_Covid-19_Cases.R

The code will automatically download the latest data from my github account.

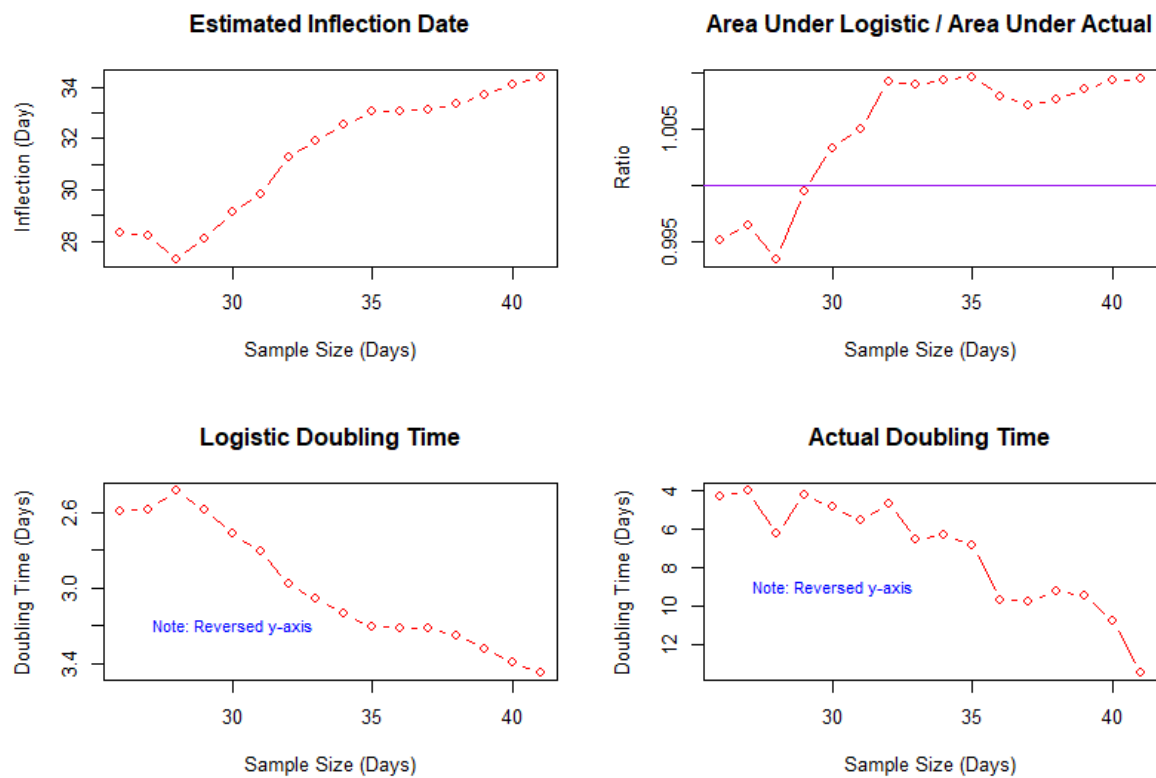The chart below shows results based on *data from 2 March to 11 April inclusive*.

The Logistic model produces an "S-shaped" growth curve. One *disadvantage* is that this S-shape is symmetric about its point of inflection.

It's also interesting to see how the results change over time as more data become available.

This is summarized in the next set of charts, which are based on successive samples, each starting on 2 March, ending after 26, 27, …., 41 days. The last sample is the full sample used to get the chart above.

The second chart indicates the on-going "good fit" of the Logistic model to the observed data. A ratio value greater than 1.0 indicates that the model is over-predicting the actual data over the full sample range. A value of 1.0 would be "ideal", in a loose overall sense.

Estimated Inflection Date

Area Under Logistic / Area Under Actual

Logistic Doubling Time

Actual Doubling Time

The following plot shows the projections for total confirmed cases of Covid-19 based on the latest version of the Logistic model. The projections go to 7 days beyond the end of the latest sample.
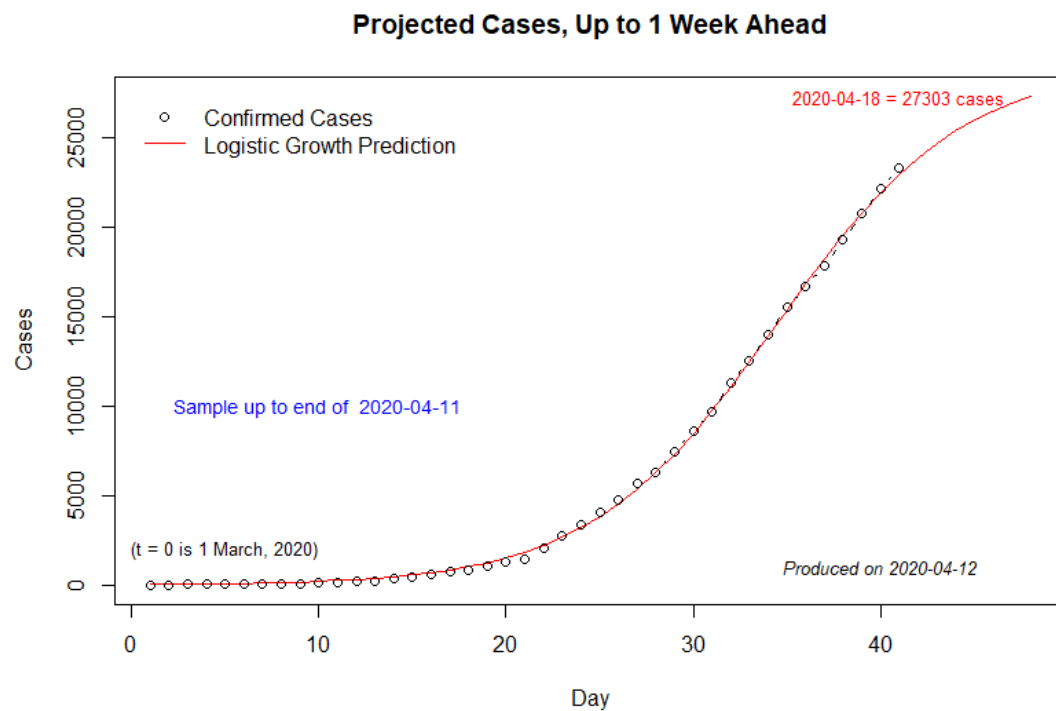

Projected Cases, Up to 1 Week Ahead

Table 1: Projected Covid-19 Cases in Canada

(Projections are in Blue; Actual Values are in Brackets)

Sample end (projection made): 08 April

09 Apr	10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr
20162 [20765]	21096 [22148]	21916 [23318]	22627	23236	23753	24188

Sample end (projection made): 09 April

10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr
21445 [22148]	22339 [23318]	23122	23798	24377	24868	25282

Sample end (projection made): 10 April

11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr
22724 [23318]	23582	24331	24977	25531	26000	26396

Sample end (projection made): 11 April

| 12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr	18 Apr
23883	24687	25385	25987	26500	26936	27303

2. Total Number of Deaths

My R code for Covid-19 modelling is at

https://raw.githubusercontent.com/DaveGiles1949/r-code/master/Canadian_Covid-19_Deaths.R

The code will automatically download the latest data from my github account.

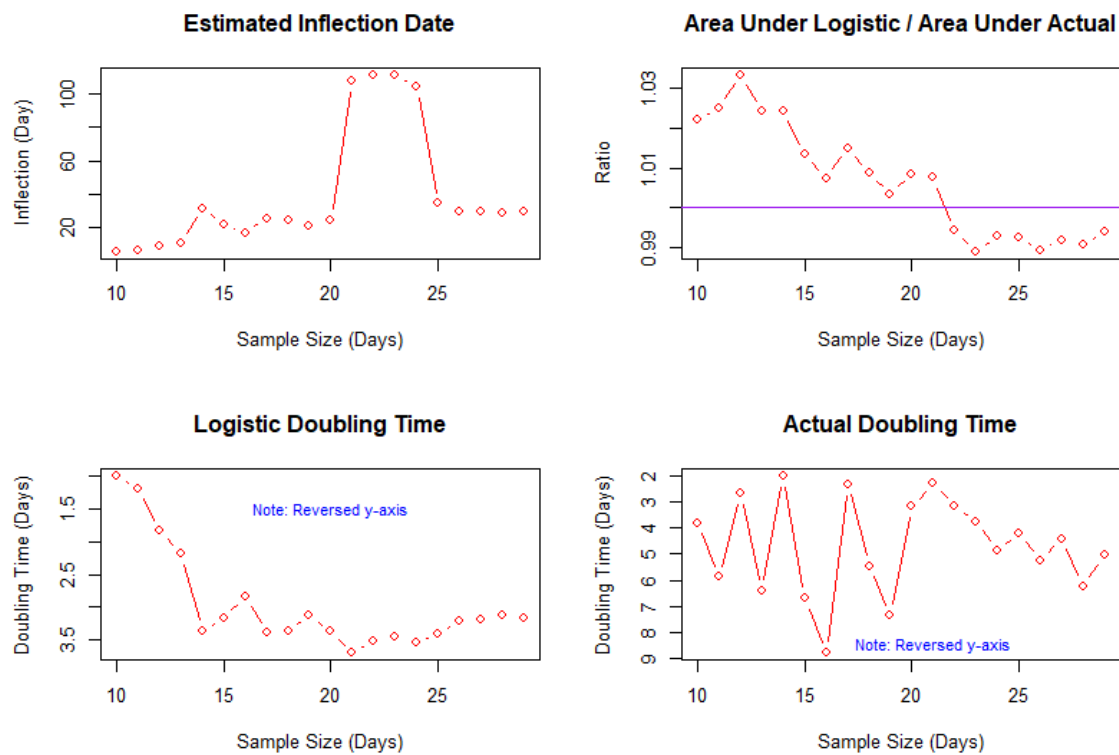The chart below shows results based on *data from 14 March to 11 April inclusive*.

The Logistic model produces an "S-shaped" growth curve. One *disadvantage* is that this S-shape is symmetric about its point of inflection.
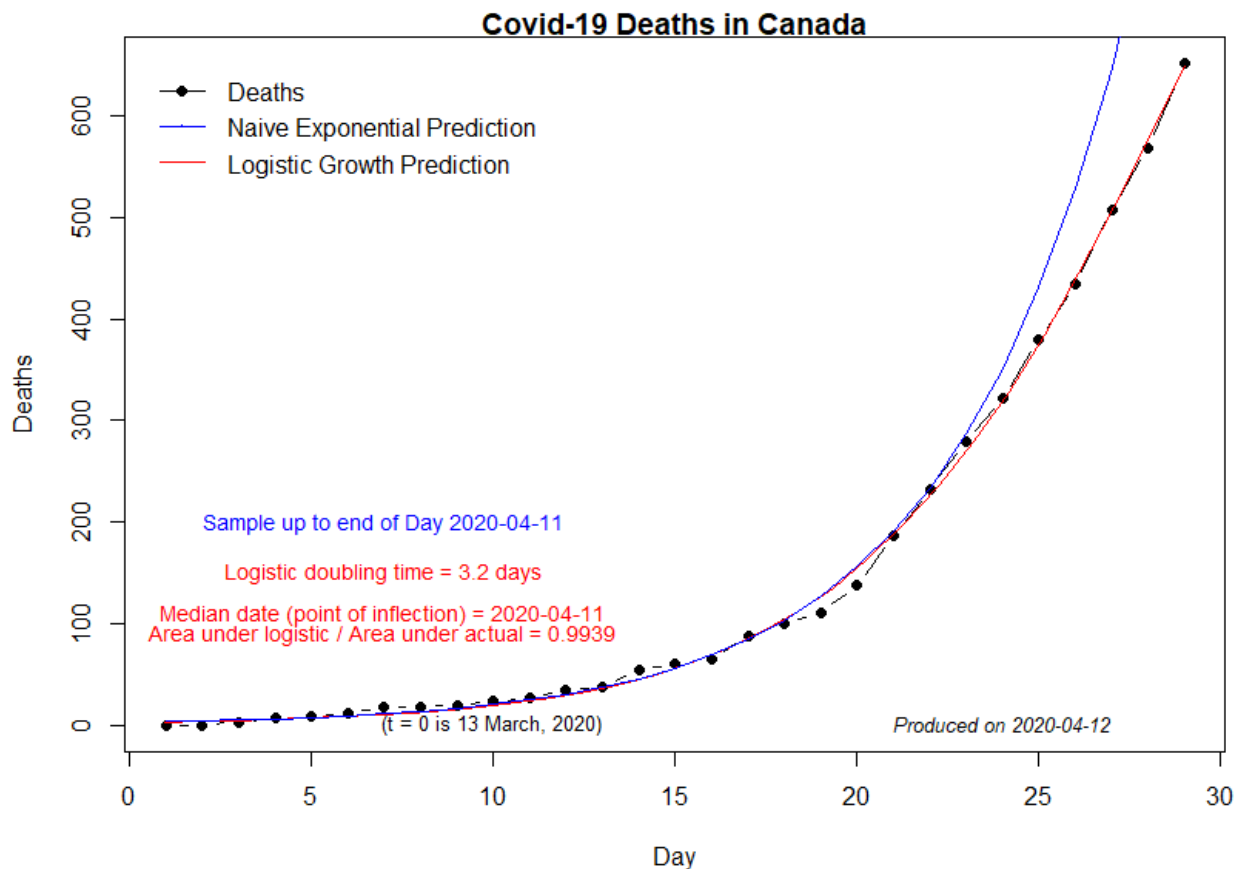
It's also interesting to see how the results change over time as more data become available.

This is summarized in the next set of charts, which are based on successive samples, each starting on 14 March, ending after 10, 11, …., 29 days. The last sample is the full sample used to get the chart above.

The second chart indicates the on-going "good fit" of the Logistic model to the observed data. A ratio value greater than 1.0 indicates that the model is over-predicting the actual data over the full sample range. A value of 1.0 would be "ideal", in a loose overall sense.

Estimated Inflection Date

Area Under Logistic / Area Under Actual

Logistic Doubling Time

Note: Reversed y-axis

Actual Doubling Time

Note: Reversed y-axis

The following plot shows the projections for total confirmed cases of Covid-19 based on the latest version of the Logistic model. The projections go to 7 days beyond the end of the latest sample.
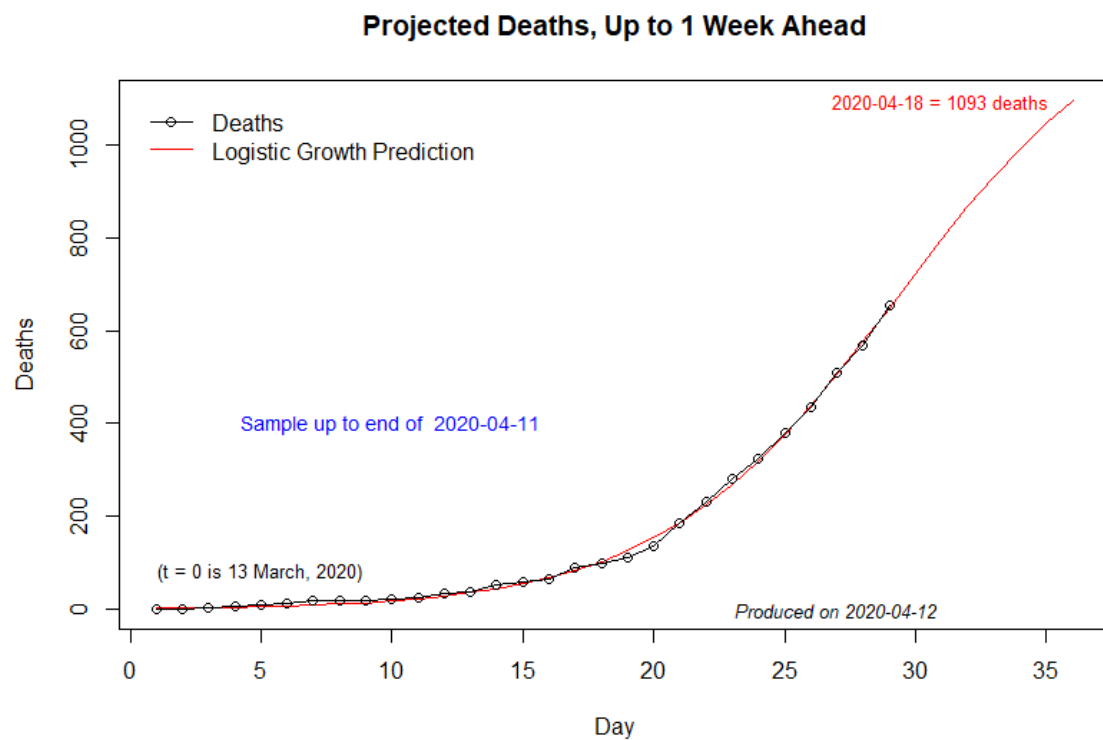
Projected Deaths, Up to 1 Week Ahead

2020-04-18 = 1093 deaths

- Deaths
- Logistic Growth Prediction

Sample up to end of 2020-04-11

(t = 0 is 13 March, 2020)

Produced on 2020-04-12

Table 2: Projected Covid-19 Deaths in Canada

(Projections are in Red; Actual Values are in Brackets)

Sample end (projection made): 08 April

09 Apr	10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr
510 [509]	585 [569]	663 [653]	744	824	902	977

Sample end (projection made): 09 April

10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr
582 [569]	659 [653]	737	815	890	962	1029

Sample end (projection made): 10 April

11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr
643 **[653]**	713	781	846	906	961	1010

Sample end (projection made): 11 April

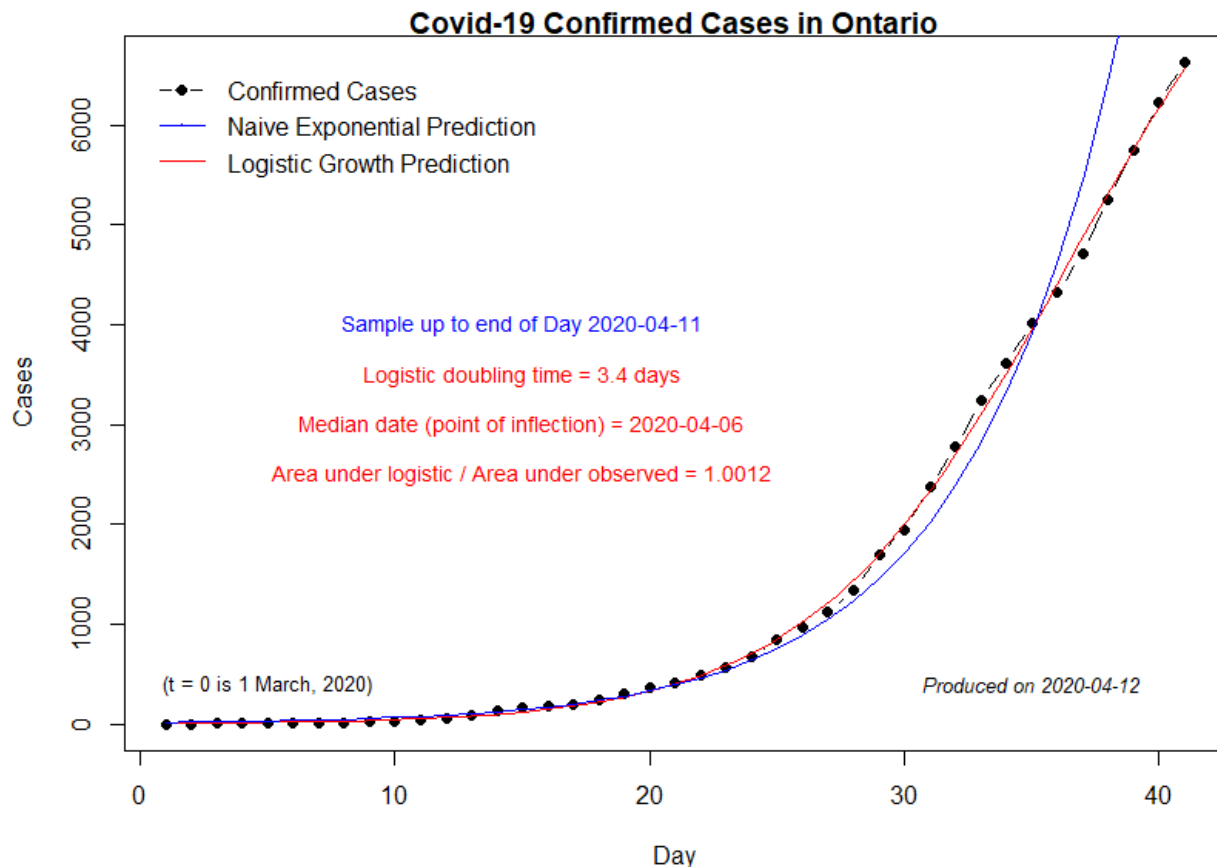| 12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr	18 Apr
723	795	865	930	991	1045	1093

1. Total Confirmed Cases

My R code for Covid-19 modelling is at

https://raw.githubusercontent.com/DaveGiles1949/r-code/master/Ontario_Covid-19_Cases.R

The code will automatically download the latest data from my github account.

The chart below shows results based on *data from 2 March to 11 April inclusive*.

The Logistic model produces an "S-shaped" growth curve. One *disadvantage* is that this S-shape is symmetric about its point of inflection.
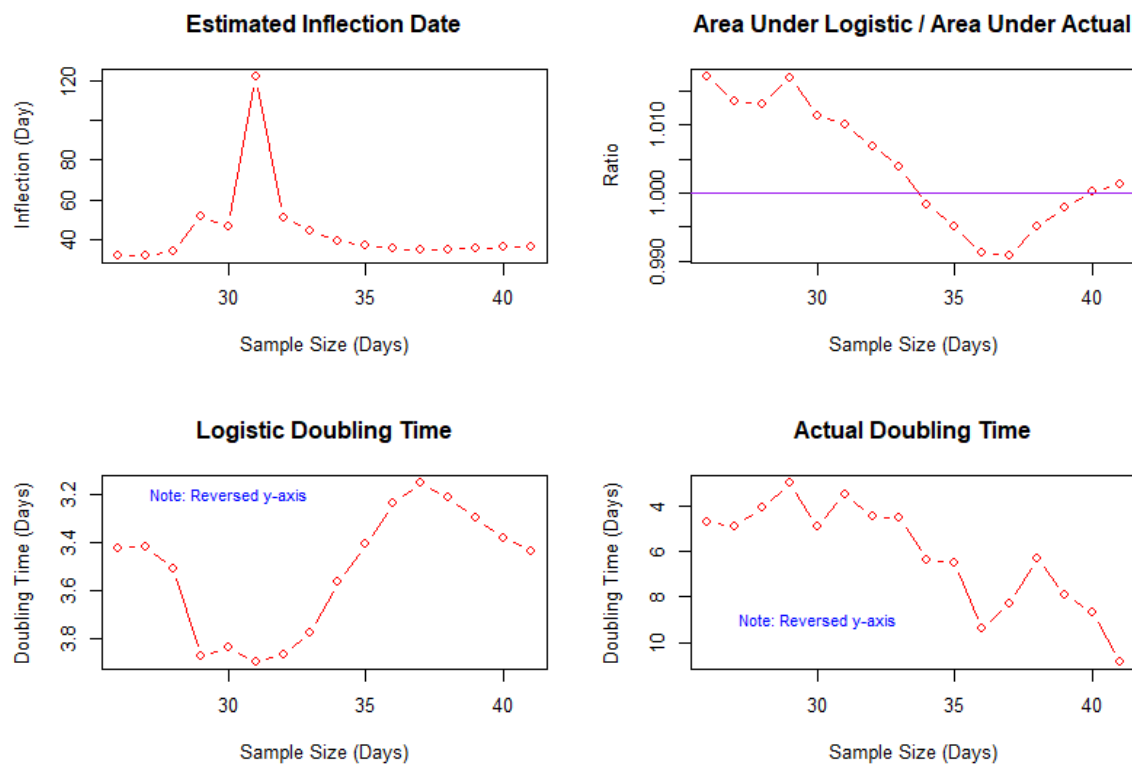

It's also interesting to see how the results change over time as more data become available.

This is summarized in the next set of charts, which are based on successive samples, each starting on 2 March, ending after 26, 27, …., 41 days. The last sample is the full sample used to get the chart above.

 The second chart indicates the on-going "good fit" of the Logistic model to the observed data. A ratio value greater than 1.0 indicates that the model is over-predicting the actual data over the full sample range. A value of 1.0 would be "ideal", in a loose overall sense.

Both the observed and estimated "doubling times" for new cases have improved substantially. (Note the reverse axis on the last two charts, and the fact that a longer doubling time is better than a short one.)

Estimated Inflection Date

Area Under Logistic / Area Under Actual

Logistic Doubling Time

Actual Doubling Time

The following plot shows the projections for total confirmed cases of Covid-19 based on the latest version of the Logistic model. The projections go to 7 days beyond the end of the latest sample.
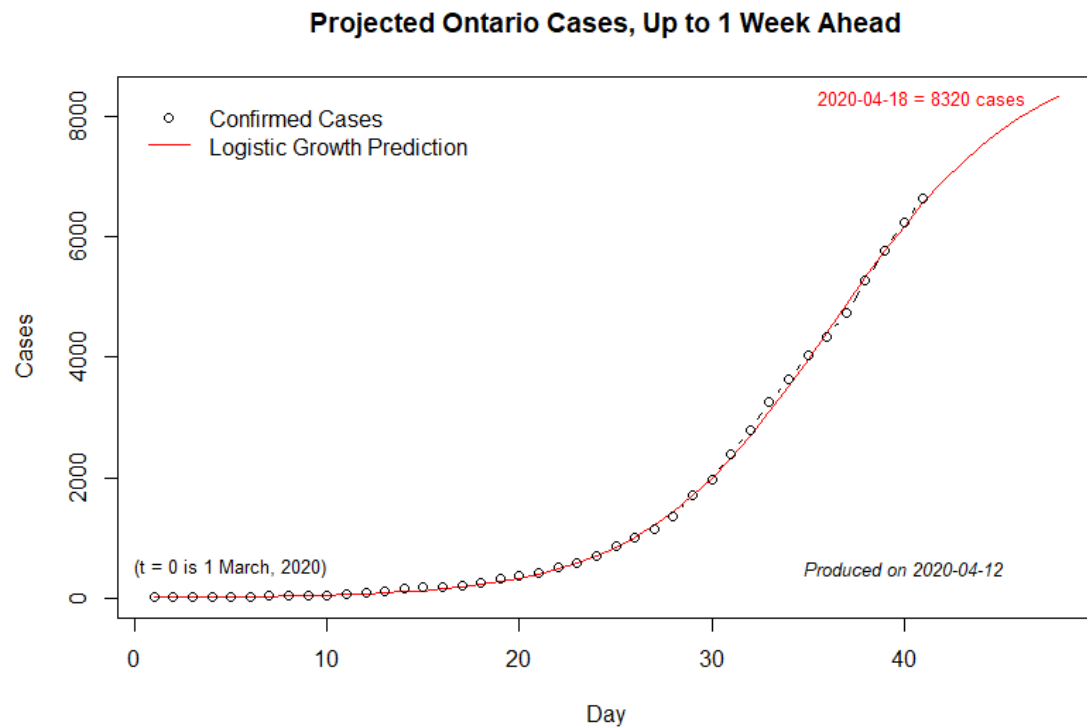

Projected Ontario Cases, Up to 1 Week Ahead

Table 3: Projected Covid-19 Cases in Ontario

(Projections are in Blue; Actual Values are in Brackets)

Sample end (projection made): 08 April

09 Apr	10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr
5575 [5759]	5913 [6237]	6217 [6648]	6485	6719	6920	7091

Sample end (projection made): 09 April

10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr
6033 [6237]	6369 [6648]	6670	6935	7167	7366	7535

Sample end (projection made): 10 April

11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr
6497 [6648]	6830	7128	7390	7619	7815	7983

Sample end (projection made): 11 April

| 12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr	18 Apr
6916	7234	7516	7763	7978	8163	8320

2. Total Number of Deaths

My R code for Covid-19 modelling is at

https://raw.githubusercontent.com/DaveGiles1949/r-code/master/Ontario_Covid-19_Deaths.R

The code will automatically download the latest data from my github account.

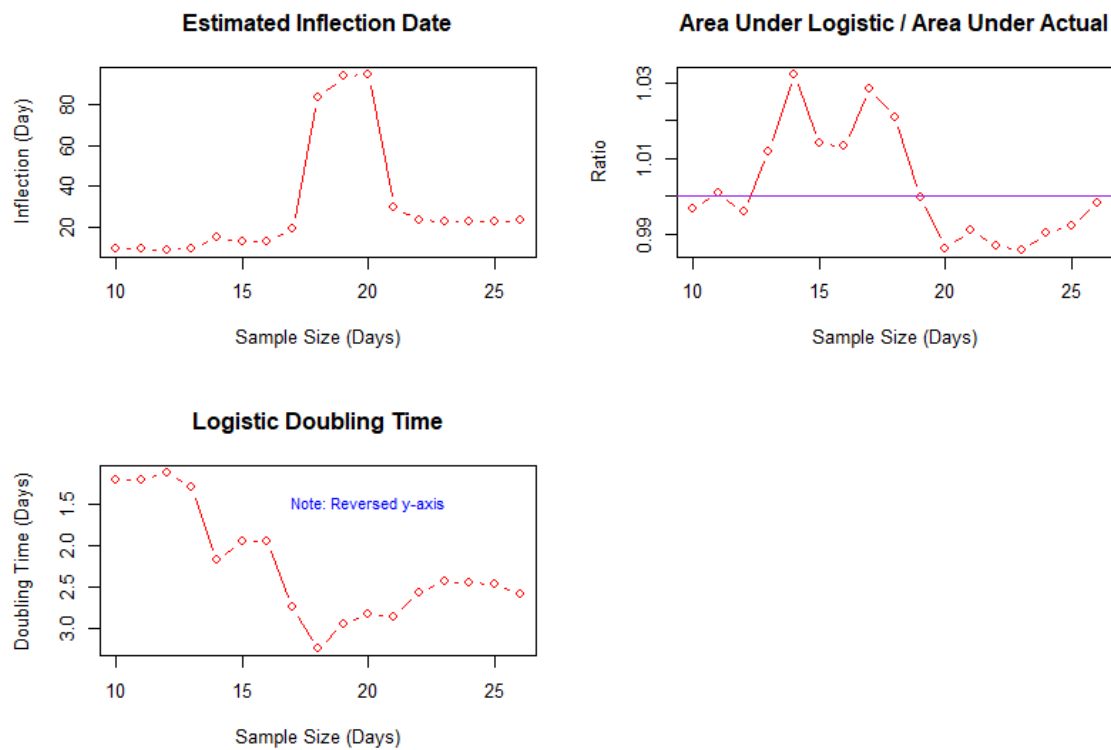The chart below shows results based on *data from 17 March to 11 April inclusive*.

The Logistic model produces an "S-shaped" growth curve. One *disadvantage* is that this S-shape is symmetric about its point of inflection.
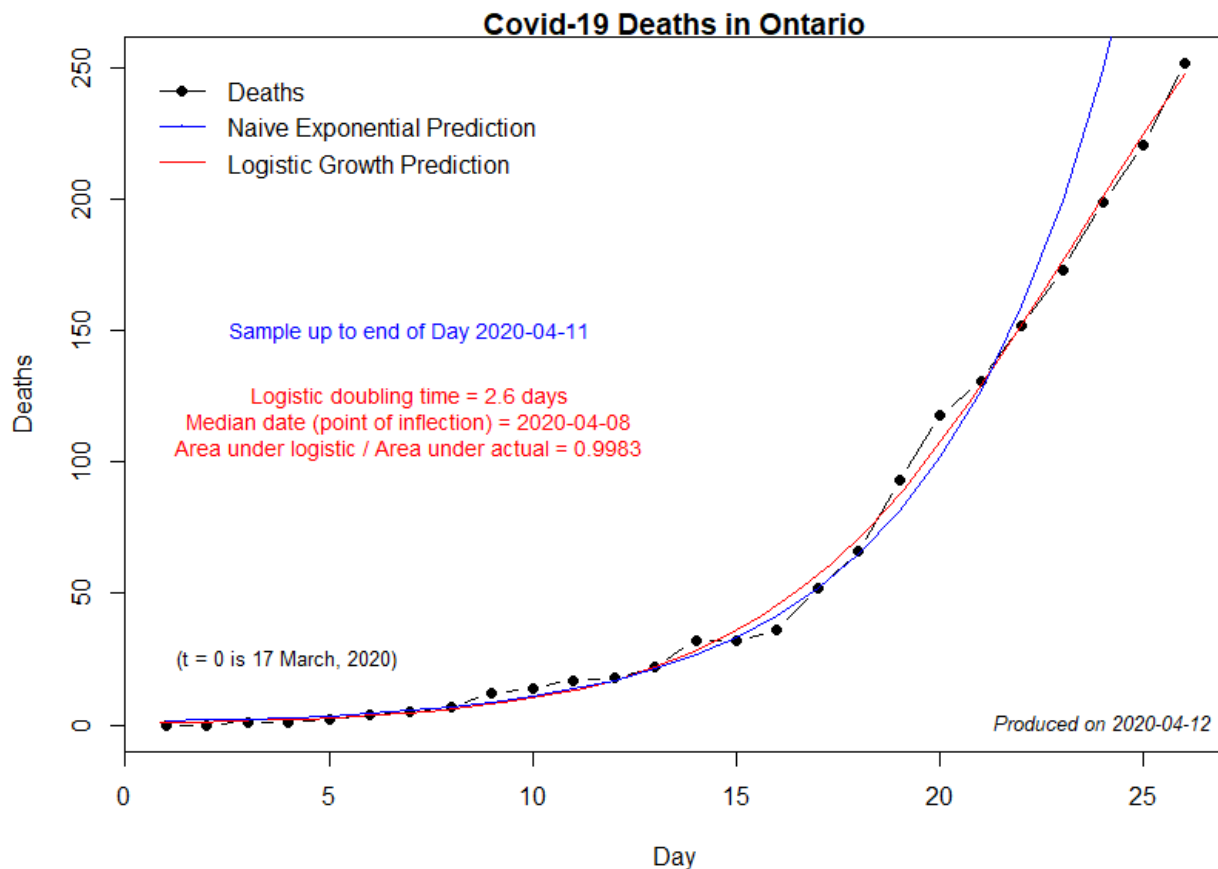
It's also interesting to see how the results change over time as more data become available.

This is summarized in the next set of charts, which are based on successive samples, each starting on 17 March, ending after 10, 11, …., 26 days. The last sample is the full sample used to get the chart above.

The second chart indicates the on-going "good fit" of the Logistic model to the observed data. A ratio value greater than 1.0 indicates that the model is over-predicting the actual data over the full sample range. A value of 1.0 would be "ideal", in a loose overall sense.

Estimated Inflection Date

Area Under Logistic / Area Under Actual

Logistic Doubling Time

The following plot shows the projections for total confirmed cases of Covid-19 based on the latest version of the Logistic model. The projections go to 7 days beyond the end of the latest sample.
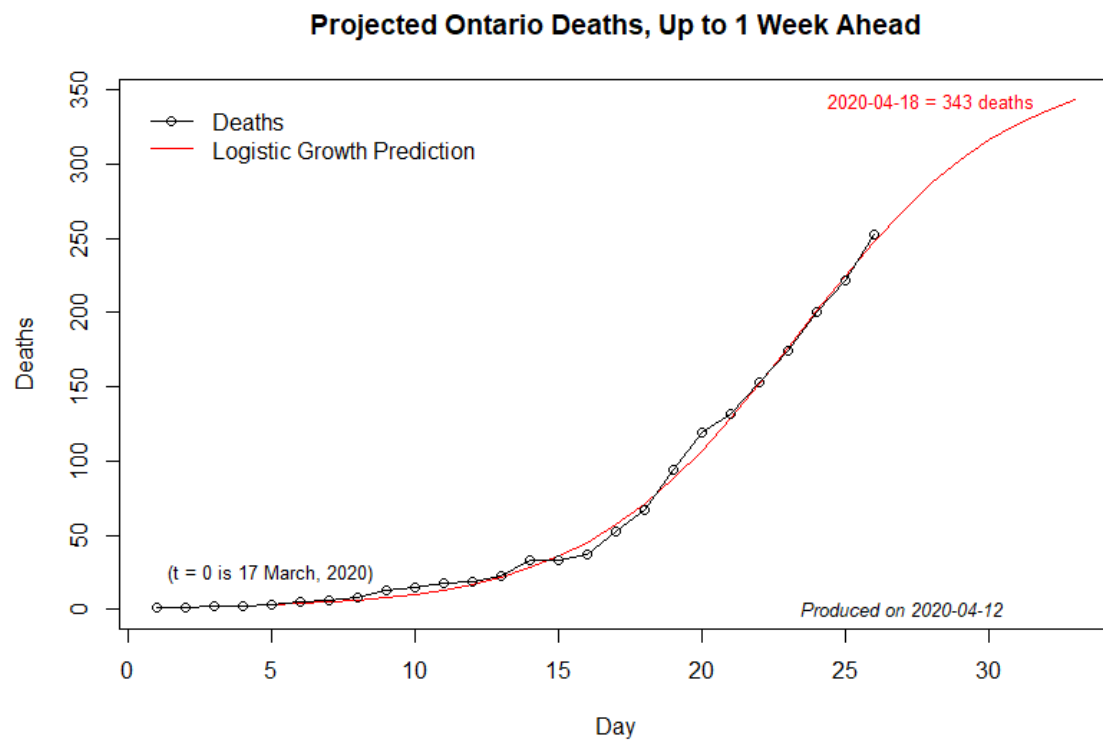
Projected Ontario Deaths, Up to 1 Week Ahead

Table 4: Projected Covid-19 Deaths in Canada

(Projections are in Red; Actual Values are in Brackets)

Sample end (projection made): 08 April

09 Apr	10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr
198 [200]	219 [222]	238 [253]	254	268	280	289

Sample end (projection made): 09 April

10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr
220 [222]	240 [253]	257	271	283	293	301

Sample end (projection made): 10 April

11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr
240 **[253]**	258	273	285	296	304	310

Sample end (projection made): 11 April

12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr	18 Apr
268	287	303	316	327	336	343