Internet Weather Forecast Accuracy

Weather forecasting is a secure and popular online presence, which is understandable. The weather affects most everyone's life, and the Internet can provide information on just about any location at any hour of the day or night. But how accurate is this information? How much can we trust it? Perhaps it is just my skeptical nature (or maybe the seeming unpredictability of nature), but I've never put much weight into weather forecasts – especially those made more than three days in advance. That skepticism progressed to a new high in the Summer of 2004, but I have only now done the research necessary to test the accuracy of online weather forecasts. First the story, then the data.

An Internet Weather Forecast Gone Terribly Awry

It was the Summer of 2004 and my wife and I were gearing up for a trip with another couple to Schlitterbahn in New Braunfels – one of the (if not *the*) best waterparks ever created.[1] As a matter of course when embarking on a 2.5-hour drive to spend the day in a swimsuit, and given the tendency of the area for natural disasters,[2] we checked the weather. The temperatures looked ideal and, most importantly, the chance of rain was a nice round goose egg.

A couple of hours into our Schlitterbahn experience, we got on a bus to leave the "old section" for the "new section." Along the way, clouds gathered and multiple claps of thunder sounded. "So much for the 0% chance of rain," I commented. By the time we got to our destination, lightning sightings had led to the slides and pools being evacuated and soon the rain began coming down in torrents – accompanied by voluminous lightning flashes. After at least a half an hour the downpour had subsided, but the lightning showed no sign of letting up, so we began heading back to our vehicles. A hundred yards into the parking lot, we passing a tree that had apparently been split in two during the storm (whether by lightning or wind, I'm not sure). Not but a few yards later, there was a distinct thud and the husband of the couple accompanying us cried out as a near racquetball sized hunk of ice rebounded off of his head and onto the concrete. Soon, similarly sized hail was falling all around us as everyone scampered for cover. Some cowered under overturned trashcans while others were more fortunate and made it indoors.

The hail, rain and lightning eventually subsided, but the most alarming news was waiting on cell phone voicemail. A friend who lived in the area had called frantically, knowing we were at the park, as the local news was reporting multiple people had been by struck by lightning at Schlitterbahn during the storm.

"So much for the 0% chance of rain," I repeated.

Testing the Skepticism

After that experience, I gave up using online weather forecasts (actually *any* weather forecast) for more than getting a reasonable idea of the "temperature decade" for the next day. I've recently begun to be a little skeptical of my own skepticism, however. What if I was the victim of a freak waterpark occurrence and was missing out on the typically reliable weather information online? Using a spreadsheet, observed data and straightforward statistics, I was set to find out.

My plan was to record the weather forecasts of some of the most popular Internet weather sites as well as actual temperatures and then to analyze the data to determine each site's accuracy. I would then be able to draw supported conclusions to apply to future use of Internet weather forecasts (if any).

Data Mining Internet Weather Forecasts

Doing an Internet search for various weather related keywords, and then cross-referencing to avoid duplication,[3] I selected the top ten weather forecast sites to be included in my survey using their Google Toolbar[4] PageRank (PR).[5] Additionally, I selected Houston, Texas as the location and *The Weather Channel* as my "actual temperature" source.[6]

- *The National Weather Service*[7] – PR9
- *BBC Weather*[8] – PR9
- *The Weather Channel*[9] – PR8
- *The Weather Underground*[10] – PR8
- *IntelliCast*[11] – PR8
- *CNN Weather*[12] – PR8
- *MSN Weather*[13] – PR8
- *The Weather Network*[14] – PR7
- *Unisys*[15] – PR7
- *AccuWeather*[16] – PR6
- *Actual* (as reported on weather.com)[17]

Then, on a daily basis I recorded the predicted low and high temperatures on each weather forecast site going back as far as was made available. This varied greatly from site to site, with *CNN Weather*, *BBC Weather*, *The Weather Underground* and *The Weather Network* providing only the current day and four days into the future, and *Accuweather* providing the current day and four_teen_ days into the future. I usually logged the data at 12pm CST, but occasionally as

late as 5pm CST, which resulted in some high temperature predictions for the current day not being available, as well as (oddly enough) the low temperature not being available in a few cases. I also recorded average and record temperatures for all days considered.

Date		20-Wed Hi	20-Wed Lo	21-Thu Hi	21-Thu Lo	22-Fri Hi	22-Fri Lo
Actual	Rec	81	26	82	23	82	15
	Ave	65	46	64	46	64	46
	Hi/Lo	76	59	70	55	65	47
The Weather Channel	0	73	57	68	49	68	45
	1	71	59	69	50	65	44
	2	71	61	69	52	64	42
	3	70	61	68	53	63	45
	4	74	59	72	53	69	49
	5	69	43	66	48	67	47
	6	68	44	64	41	60	43
	7	71	50	60	44	57	44
	8	66	46	62	42	58	42
	9	68	46	62	42	59	46
The Weather Underground	0	74	57	65	46	65	42
	1	71	59	68	44	65	43
	2	73	60	68	50	62	43
	3	73	59	69	52	65	47
	4	72	60	69	50	67	50
IntelliCast	0	73	57	68	49	68	45
	1	73	59	69	50	65	44
	2	71	61	69	51	64	42
	3	71	61	68	53	63	45
	4	74	59	72	53	69	49
	5	69	43	66	48	67	47
	6	68	44	64	41	60	43
	7	71	50	60	44	57	44
	8	67	45	62	42	58	42
	9	68	46	58	41	59	46
CNN Weather	0	75	57	66	49	65	45
	1	73	57	66	47	68	45
	2	75	63	69	51	61	45
	3	72	63	71	54	65	45
	4	76	58	72	54	71	53
MSN Weather	0	72	46	67	42	66	43
	1	72	53	69	46	66	42
	2	69	49	69	48	66	43
	3	74	49	69	46	66	45
	4	74	50	70	47	66	42
	5	60	45	68	50	66	47
	6	69	35	60	46	64	42
	7	68	43	45	33	50	39
	8	64	51	50	37	44	35
	9	58	44	63	49	52	40
The Weather Network	0	71	57	68	46	66	42
	1	71	59	71	57	62	41
	2	69	60	64	50	62	41
	3	69	60	66	51	62	42
	4	73	59	71	51	69	46

Table 1: Sample portion of data sheet.

Calculations on Forecast Accuracy and Consistency

In order to assess the accuracy and consistency of each weather forecast site, I first found the absolute values of the differences between the predicted and actual temperatures. For example, considering the data presented in Table 2 above, the actual high temperature in Houston, TX on Thursday, December 21st was 70Â° F. At noon on Thursday, December 14th, *The Weather Channel* online predicted the high on that day would be 60Â° F, 10Â° off of the actual and yielding an "accuracy value" of *10*. On the same day, *MSN Weather* online predicted a high of 45Â° F, corresponding to a value of *25* – the higher number indicating a poorer performance. The tables turned somewhat two days later when *The Weather Channel* predicted 66Â° and *MSN Weather* predicted 68Â°, resulting in accuracy values of *4* and *2*, respectively.

Next, I calculated the mean and standard deviation of these accuracy values for each weather forecast site and predictive period (e.g., *Accuweather* two days in advance, *The Weather Network* four days in advance, etc.). The mean value representing the average accuracy and the standard deviation representing the consistency, or "spread," of the accuracy values.[18]

The following tables and graphs summarize the gathered weather forecast accuracy and consistency data by organizing it into columns by the number of days previous. Note than in both cases a *lower* number represents a better performance.

Online Weather Channel	0 Hi	0 Lo	1 Hi	1 Lo	2 Hi	2 Lo	3 Hi	3 Lo	4 Hi	4 Lo	5 Hi	5 Lo	6 Hi	6 Lo	7 Hi	7 Lo	8 Hi	8 Lo	9 Hi	9 Lo	10 Hi	10 Lo	11 Hi	11 Lo	12 Hi	12 Lo	13 Hi	13 Lo	14 Hi	14 Lo
The National Weather Service	2.44	4.90	3.26	5.74	2.98	5.21	3.98	5.55	4.22	5.56	3.80	5.65	5.51																	
BBC Weather	3.62	5.06	4.38	5.71	3.81	5.95	4.50	6.31	5.23	7.16																				
The Weather Channel	2.50	5.00	3.38	5.17	3.00	4.40	3.93	4.69	4.32	4.93	4.20	5.78	5.67	5.74	5.95	5.61	6.84	6.05	6.36	6.19										
The Weather Underground	2.68	5.17	3.71	5.62	3.40	5.62	4.07	5.17	4.34	5.88																				
IntelliCast	2.48	5.15	3.36	5.17	3.17	4.48	4.12	4.71	4.51	5.10	4.45	5.75	5.74	5.77	5.61	5.66	6.92	6.16	6.39	6.31										
CNN Weather	2.34	4.73	3.12	5.71	3.24	5.00	3.90	4.83	5.41	5.46																				
MSN Weather	2.65	6.88	3.31	6.50	3.70	6.26	4.07	7.31	4.46	7.34	4.80	5.18	5.58	6.56	8.11	7.66	10.16	9.00	10.03	8.28										
The Weather Network	3.16	5.41	3.79	5.62	3.48	5.10	4.55	5.95	4.05	5.63																				
Unisys	3.16		3.55	3.38	2.98	3.83	4.05	3.38	4.32	4.59	4.10	5.55	5.51	5.03																
Accuweather	2.37	5.22	3.14	6.24	3.52	5.50	3.74	5.17	3.85	5.24	4.58	5.10	5.18	5.51	7.00	9.32	7.65	9.27	6.28	6.58	5.57	9.20	6.97	8.49	7.23	8.11	7.89	8.37	6.85	9.59

Table 2: Average accuracy of each weather forecast site by the number of days previous (lower is better).
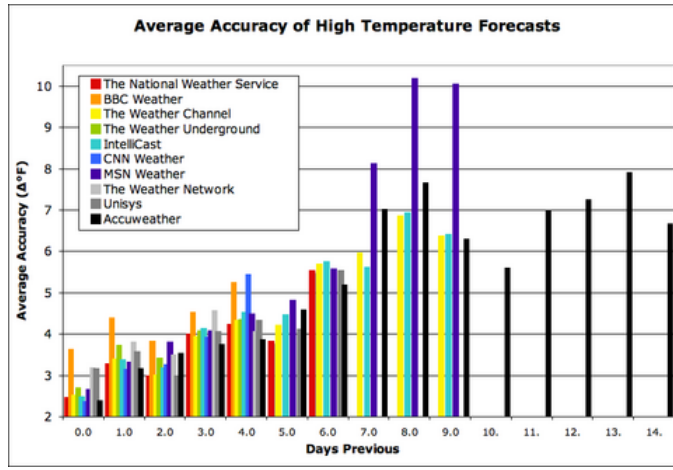
Figure 1. Average accuracy of the high temperature forecasts of each weather forecast site by the number of days previous (lower is better).
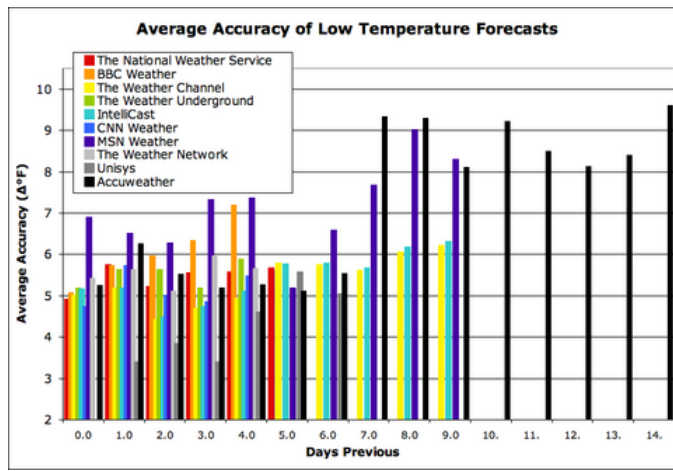

Figure 2. Average accuracy of the low temperature forecasts of each weather forecast site by the number of days previous (lower is better).

Table 3: Consistency of each weather forecast site by the number of days previous (lower is better).
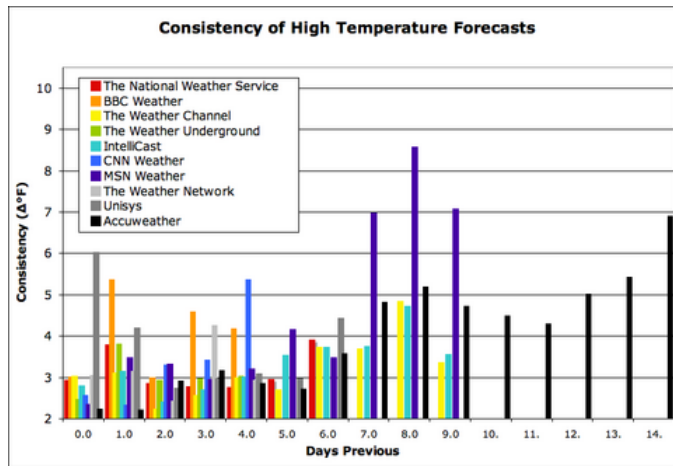
Figure 3. Consistency of the high temperature forecasts of each weather forecast
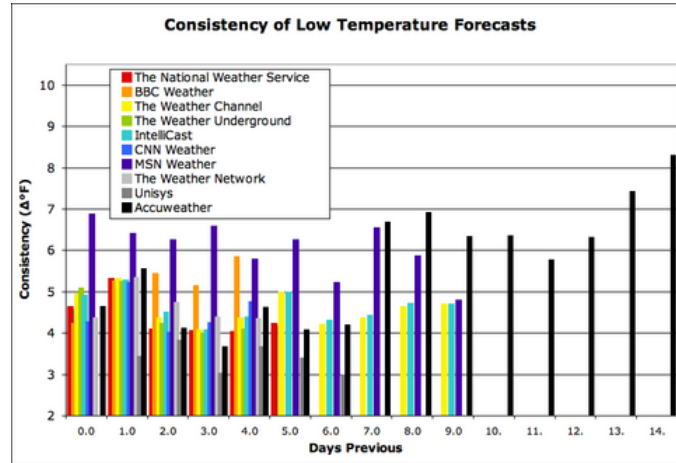site by the number of days previous (lower is better).

Figure 4. Consistency of the low temperature forecasts of each weather forecast site
by the number of days previous (lower is better).

Ranking Forecasts by Accuracy and Consistency

I then ranked the accuracy and consistency of each weather forecast site as compared to the competing sites (i.e., the other sites providing forecasts). Note
that days 10 through 14 were omitted as *Accuweather* was the only site providing a weather forecast.

Online Weather Channel	Average Accuracy Rank by Days Previous																			
	0		1		2		3		4		5		6		7		8		9	
	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo
The National Weather Service	3	2	3	8	1	6	4	7	3	6	1	4	2							
BBC Weather	10	4	10	6	10	9	9	9	9	9										
The Weather Channel	5	3	6	2	3	2	3	2	4	2	3	6	5	3	2	1	1	1	2	1
The Weather Underground	7	6	8	4	6	8	6	5	6	8										
IntelliCast	4	5	5	2	4	3	8	3	8	3	4	5	6	4	1	2	2	2	3	2
CNN Weather	1	1	1	6	5	4	2	4	10	5										
MSN Weather	6	9	4	10	9	10	6	10	7	10	6	2	4	5	4	3	4	3	4	4
The Weather Network	9	8	9	4	7	5	10	8	2	7										
Unisys	8		7	1	1	1	5	1	4	1	2	3	2	1						
Accuweather	2	7	2	9	8	7	1	5	1	4	5	1	1	2	3	4	3	4	1	3

Table 4: Accuracy rank of each weather forecast site by the number of days previous (higher is better).

Online Weather Channel	Consistency Rank by Days Previous																			
	0		1		2		3		4		5		6		7		8		9	
	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo
The National Weather Service	6	5	7	6	5	3	3	4	1	2	3	3	5							
BBC Weather	7	1	10	4	8	9	10	9	9	10										
The Weather Channel	8	7	3	7	1	6	1	6	4	5	1	5	4	3	1	1	2	1	1	1
The Weather Underground	3	8	8	3	7	5	5	3	6	3										
IntelliCast	5	6	4	5	2	7	2	5	5	6	5	4	3	4	2	2	1	2	2	1
CNN Weather	4	2	2	2	9	2	8	7	10	8										
MSN Weather	2	9	6	10	10	10	4	10	8	9	6	6	1	5	4	3	4	3	4	3
The Weather Network	9	3	5	8	3	8	9	8	3	4										
Unisys	10		9	1	4	1	6	1	7	1	4	1	6	1						
Accuweather	1	4	1	9	6	4	7	2	2	7	2	2	2	2	3	4	3	4	3	4

Table 5: Consistency rank of each weather forecast site by the number of days previous (lower is
better).

Additionally, I organized the accuracy and consistency rankings with respect to short, mid and longterm weather forecasts as dictated by the data groupings. I
scored each weather forecast site with points corresponding to each ranking it received within the specified time period. For example, in order to rank
weather forecast sites in the short term grouping (0-4 days in advance), I multiplied the number of first place ranks by 10, added the number of second place
ranks multiplied by 9, and continued in this manner through adding the number of tenth place rankings multiplied by 1. The higher the score, the higher the
ranking. Mid and long term group rankings were similarly determined with the calculations modified to fit the number of participating weather forecast sites.

Online Weather Channel	Average Accuracy Rank Groupings		
	0-4	5-6	7-9
The National Weather Service	4	3	
BBC Weather	10		
The Weather Channel	1	4	1
The Weather Underground	7		
IntelliCast	5	6	2
CNN Weather	2		
MSN Weather	9	4	4
The Weather Network	8		
Unisys	3	1	
Accuweather	6	2	3

Table 6: Accuracy rank groupings for short (0-4 days previous), mid (5-6 days previous), and long term (7-9 days previous) weather forecasts.

Online Weather Channel	Average Consistency Rank Groupings		
	0-4	5-6	7-9
The National Weather Service	1	5	
BBC Weather	9		
The Weather Channel	4	3	1
The Weather Underground	5		
IntelliCast	3	4	2
CNN Weather	7		
MSN Weather	10	5	3
The Weather Network	8		
Unisys	5	2	
Accuweather	2	1	3

Table 7: Consistency rank groupings for short (0-4 days previous), mid (5-6 days previous), and long term (7-9 days previous) weather forecasts.

Correlation of Variables to Weather Forecast Accuracy and Consistency

I also ran correlation analysis on various factors to see if they explained any of the accuracy differences observed.[19] Specifically, I analyzed the following variables in order to check for the listed corresponding correlation trends:

- *Number* – trends over time. I numbered the days for which the temperature was being forecast from 1 to 62, starting with December 1, 2006 (#1) and ending with January 31, 2007 (#62).
- *Day* – trends with the day of the week.
- *Hi/Lo* – trends between high and low forecasts. If the forecast was for a daytime high, this value was 0; if it was for an overnight low, it was 1.
- *Site* – trends between different sites. Again a column for each site was used with a 1 value for when the particular site was making the prediction and a 0 value when it was another site.
- *Previous* – trends between the number of days ahead the forecast was predicting. Starting with predictions made on the same day (i.e., the forecast for today's high or tonight's low), this value ran from 0 to 14.

Number	Hi/Lo	Prvs	National Weather Service	BBC	Weather Channel	Weather Underground	Intellicast	CNN	MSN	Weather Network	Unisys	Accuweather	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Diff
1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1
1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1
1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3
1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	3
1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	3
1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4
1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	4
1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1
1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	3
1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	3
1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4

Table 8. Accuracy data arranged for correlation analysis.

I compared the resulting correlation values with some standard values[20] to determine if there were *small*, *medium*, *large* or *no* trends correlating with the weather forecast accuracy numbers.

Correlation	from	to
Small	0.10	0.29
Medium	0.30	0.49
Large	0.50	1.00

Table 9. Standard limits for interpreting correlation values.

Variable	Correlation to Diff
Hi/Lo	0.1362
Prvs	0.2447
Number	0.0358
Mon	-0.0479
Tue	-0.0537
Wed	-0.0045
Thu	0.0314
Fri	-0.0211
Sat	0.0690
Sun	0.0262
National Weather Service	-0.0455
BBC	0.0003
Weather Channel	-0.0187
Weather Underground	-0.0369
Intellicast	-0.0154
CNN	-0.0465
MSN	0.0917
Weather Network	-0.0295
Unisys	-0.0691
Accuweather	0.1053

Table 10. Correlation values between various variables and weather forecast accuracy.

These results indicated a trend for more accurate weather forecasts closer to the temperature in question and when a high temperature is being predicted. No weather forecast site was shown to be significantly more accurate than another, though – something that does not seem to jive with the previously generated tables and graphs. It is important to note, however, that these values are generalized over all forecasting periods and for both high and low temperatures. I ran

another correlation analysis to remove these variables, just the high temperature forecasts published 0 days previous in this case.

Variable	Correlation to Diff
National Weather Service	-0.0289
BBC	0.0917
Weather Channel	-0.0216
Weather Underground	-0.0041
Intellicast	-0.0273
CNN	-0.0428
MSN	-0.0077
Weather Network	0.0474
Unisys	0.0431
Accuweather	-0.0400

Table 11. Correlation values by weather forecast site for high temperature forecasts made 0 days previous.

These numbers again showed no significant correlation between the weather forecast site and the accuracy of the weather forecast. Looking back at Figure 1 and Table 2, however, this wasn't too surprising. The forecast accuracies in this selection were reasonably tightly grouped, with the exception of *BBC*, and *BBC* was on the verge of having a small correlation. I made another selection and ran a third correlation analysis, this time on the more loosely grouped accuracy values for low temperature forecasts published 3 days previous. These numbers showed small correlations for *MSN* and *Unisys*, which are reflected by the relatively large separation from the pack in Figure 2 and Table 2.

Variable	Correlation to Diff
National Weather Service	0.0027
BBC	0.0755
Weather Channel	-0.0471
Weather Underground	-0.0116
Intellicast	-0.0453
CNN	-0.0329
MSN	0.1573
Weather Network	0.0453
Unisys	-0.1378
Accuweather	-0.0062

Table 12. Correlation values by weather forecast site for low temperature forecasts 3 days previous.

Conclusion

While the tabled rankings brought out the competitor in me, it was obvious from the correlation analysis that only the numbers clearly "separate from the pack" in Figures 1-4 are better or worse enough as to be statistically significant. Thus, there were a few shiners and a few duds, but the variation among the rest can be explained away by chance. The trends I observed included:

- In seeking high temperature forecasts, it looked best to use *IntelliCast* or *The Weather Channel* in the long term, but there wasn't a clear leader in the short to mid term. *BBC* seemed unreliable in all cases, as well as *MSN* in the long term. *The Weather Network*, *CNN* and *Unisys* all had blemishes (3, 4 and 0 days in advance, respectively), but were generally in with the pack.
- In seeking low temperature forecasts, *IntelliCast* and *The Weather Channel* were again the choice in the long term, joined by *Unisys* in the short term. *BBC* was still a dud in anything but the very short term, and *MSN* performed horribly in nearly all cases, as well as *Accuweather* in the long term.
- *Accuweather* was the clear leader in anything greater than 10 days in advance, being the only site providing a weather forecast.

In addition to the above observations/recommendations, it was clear from the correlation analysis that the further removed a weather forecast is, the less accurate it will likely be. Much more unexpectedly, however, it was also clear that predictions of the overnight low temperature are less accurate than those of the daytime high.

Overall, the accuracy and consistency values prescribed caution – even when considering the most accurate and consistent weather forecasts. For example, if I wanted to know the high temperature for tomorrow, the numbers showed *CNN Weather* to be the most accurate Internet weather resource. Its weather forecast, however, comes with an average accuracy value of over 3Â° and a consistency value of over 2Â°. Thus, the conscientious browser would need to

mentally append "with an accuracy of 3Â°Â±2Â°" to the temperature prediction and realize this results in a two degree span at best and a *ten* degree span at worst. This means a pessimist would be justified in reading a prediction of "75Â°" for tomorrow's high as nothing more than "70Â°-80Â°" – and this using the *best* online resource available! Granted, the optimist would also be justified in reading the same prediction as "74Â°-76Â°," but it's always best to plan for the worst case – especially when going to Schlitterbahn.

Many of the other less accurate weather forecasts, then, seem to be practically worthless for all but the most optimistic. Take, for example, the best option for determining the overnight low temperature a week from today, *The Weather Channel*. The appropriate accuracy baggage on this Internet weather forecast site would be ~5.6Â°Â±4.4Â°, pessimistically reducing a forecast of "50Â°" to "40Â°-60Â°" (!!). Perhaps this explains why only four sites ventured to provide weather forecasts more than a week in advance, and four others didn't even push beyond four days.

So, what of my skepticism? I'd say it's going strong. While the difference between online weather forecast sites was less than I expected, the accuracy and consistency results support a strong dose of skepticism anytime you lookup the weather on the Internet.[21]

Notes

[1] "Schlitterbahn Waterpark Resort." *Schlitterbahn.com.* Accessed January 2007 from http://www.schlitterbahn.com/nb/. According to this site, " Schlitterbahn Waterpark ResortÂ® received top awards in the World's Best Waterpark, World's Best Waterpark Landscaping and the World's Best Waterpark Ride categories during the 2006 Golden Ticket Award ceremony at Holiday World amusement park."

[2] "'Devastating' Texas floods kill 9." *CNN.com*. Accessed January 2007 from http://archives.cnn.com/2002/WEATHER/07/05/texas.flooding/index.html. I personally participated in the cleanup efforts following this flooding as a member of a group of about 15 people that spent an entire day tearing apart a house that had been picked up in this flood and dropped on it's site. You bet we were going to check the weather.

[3] One example of such duplication is that both *Yahoo Weather* (accessed January 2007 from http://weather.yahoo.com/) and *USAToday Weather* (accessed January 2007 from http://asp.usatoday.com/weather/weatherfront.aspx) use *The Weather Channel* [[accessed January 2007 from http://www.weather.com/) as their source.

[4] "Google Toolbar Features." *Google_. Accessed December 2007 from http://toolbar.google.com/button_help.html*help.html.

[5] "Our Search: Google Technology." *Google*. Accessed December 2007 from http://www.google.com/technology/index.html. According to Google, "PageRank relies on the uniquely democratic nature of the web by using its vast link structure as an indicator of an individual page's value."

[6] While some may suspect biased results due to selecting one of the weather forecast sites included in my survey for the actual temperature comparison, these values are reported from third-party measuring stations such as airports without regard to the reporting site.

[7] *The National Weather Service*. Main URL: http://www.nws.noaa.gov/. Data gathered from: http://www.srh.noaa.gov/forecast/MapClick.php?CityName=Houston&state=TX&site=HGX. Accessed January 2007.

[8] *BBC Weather_. Main URL: http://www.bbc.co.uk/weather/. Data gathered from: http://www.bbc.co.uk/weather/5day_f.shtml?world=0268*f.shtml?world=0268. Accessed January 2007.

[9] *The Weather Channel_. Main URL: http://www.weather.com/. Data gathered from: http://www.weather.com/weather/tenday/USTX0617?from=month_topnav_undeclared*undeclared. Accessed January 2007.

[10] *The Weather Underground*. Main URL: http://www.wunderground.com/. Data gathered from: http://www.wunderground.com/cgi-bin/findweather/getForecast?query=houston%2C+tx. Accessed January 2007.

[11] *IntelliCast*. Main URL: http://www.intellicast.com/IcastPage/LoadPage.aspx. Data gathered from: http://www.intellicast.com/IcastPage/LoadPage.aspx?seg=LocalWeather& SearchResults=True&loc=kiah&product=Forecast&prodgrp=Forecasts&prodnav=none. Accessed January 2007.

[12] *CNN Weather*. Main URL: http://www.cnn.com/WEATHER/. Data gathered from: http://weather.cnn.com/weather/forecast.jsp?locCode=HOU. Accessed January 2007.

[13] *MSN Weather*. Main URL: http://weather.msn.com/. Data gathered from: http://weather.msn.com/tenday.aspx?wealocations=wc:USTX0617. Accessed January 2007.

[14] *The Weather Network*. Main URL: http://www.theweathernetwork.com/. Data gathered from: http://www.theweathernetwork.com/weather/cities/usa/Pages/USTX0617.htm#longTerm. Accessed January 2007.

[15] *Unisys*. Main URL: http://weather.unisys.com/. Data gathered from: http://weather.unisys.com/forecast.cgi?Name=houston%2C+tx&Go.x=0&Go.y=0. Accessed January 2007.

[16] *AccuWeather*. Main URL: http://home.accuweather.com/index.asp?partner=accuweather. Data gathered from: http://wwwa.accuweather.com/forecast-15day.asp?partner=accuweather&traveler=0&zipChg=1&zipcode=77001&metric=0. Accessed January 2007.

[17] *The Weather Channel_. Main URL: http://www.weather.com/. Data gathered from: http://www.weather.com/weather/pastweather/USTX0617?from=36hr_topnav_undeclared*undeclared. Accessed January 2007.

[18] It may be best to picture these values as if you were at a shooting range. Someone who shoots close to the center is accurate, while someone who shoots with a tight grouping at any location is consistent.

[19] Weiss, Neil A. "Elementary Statistics: Descriptive Methods in Regression and Correlation." Addison Wesley Longman, Inc. 1999. More information on the methods and calculations involved in correlation analysis.

[20] Cohen, J. *Statistical power analysis for the behavioral sciences, 2nd ed.* Hillsdale, NJ: Lawrence Erlbaum Associates. 1988.

[21] I'd be willing to bet skepticism would be warranted for weather forecasts on television, also, but that's another article for another time.

  This article was edited after publication by the author on 10 Dec 2008. <u>View changes.</u>