Statistics of Human Penis Size

www.cocksizecontest.com

Abstract

Using data from the website www.cocksizecontest.com we examine various properties of human penis size, including the mean and the distributions of both length and girth. Though the self-reported data shows some evidence of biases, these can be eliminated with simple verification processes. We find that the distribution closely approximates a normal distribution with a mean length of about 17.2 cm (6 3/4 inches) and standard deviation of 1.8 cm. Generally, we suggest anybody with a length outside $\pm 2\sigma$, i.e. less than 13.6 cm or greater than 21 cm, should be considered "small" or "large", respectively.

1 Introduction

The size of the human penis is something that concerns all men. It is often seen as being a manifestation of one's manhood, and as such most men are interested in knowing how their own size compares to others. The average penis length is usually reported to be about 14 cm, or about 5.5 inches.

However, it is likely that this value is an underestimate. Since having a large penis size is so important, it is beneficial to both small and large men to deflate the average size. For small men, this helps one to feel more "normal", or to ease the internalized humiliation one can feel at being less than other men. For average or larger men, reducing the reported average has the benefit of making one feel more confident about one's size.

This study seeks to establish an estimate of the average human penis size based on self-reported data from the website www.cocksizecontest.com. We will attempt to remove any biases evident in the data and establish where the true mean lies, what the distribution of sizes is, and offer some suggestions about where qualitative terms like "small", "average", "large", and "hung" should come into use.

2 Data

2.1 Description of data sets

We will be examining data from the website `www.cocksizecontest.com` (hereafter "CSC"), for which users measure their own penises and enter both their length and girth, in centimetres, into the system when registering. The purpose of the site is to allow members to compare their penis sizes to establish who is bigger (by volume), either winning or losing "manhood" points in the process.

While one could easily overstate their actual size, it is thought that by doing so one takes the fun out of subsequent bets and comparison. Nonetheless, there are some additional protections in place to ensure accurate sizes. Before one can make any comparisons, one must confirm their email address, and upload a "bulge pic", which is a photo of their penis in underwear, swimwear, or similar, to give a suggestion of the actual size without giving away the exact number. This bulge pic is the only information uses have when sizing each other up before betting manhood on a comparison. The final step is to upload a "verification" pic, which includes a photo of one's username next to their penis, so that the site administrator has proof that the photos belong to the user in control of the account. Many users who upload verification pics will also upload pictures of their penis being measured, according to specific instructions on the site. Whenever photos show a different size than reported, or show evidence of being doctored to appear larger, the site administrator can either deduct manhood from the user or adjust their reported size manually. Histograms of length and girth can be seen in Figures 1 and 2 respectively. Note that with each additional verification step completed, the number of users drops (see Table 1).

2.2 Outliers

We consider this data to represent a cross section of the general population, with some caveats. One natural bias in the user base would be that a site such as CSC will select for men that are confident enough about their size to take part in comparisons with other men.

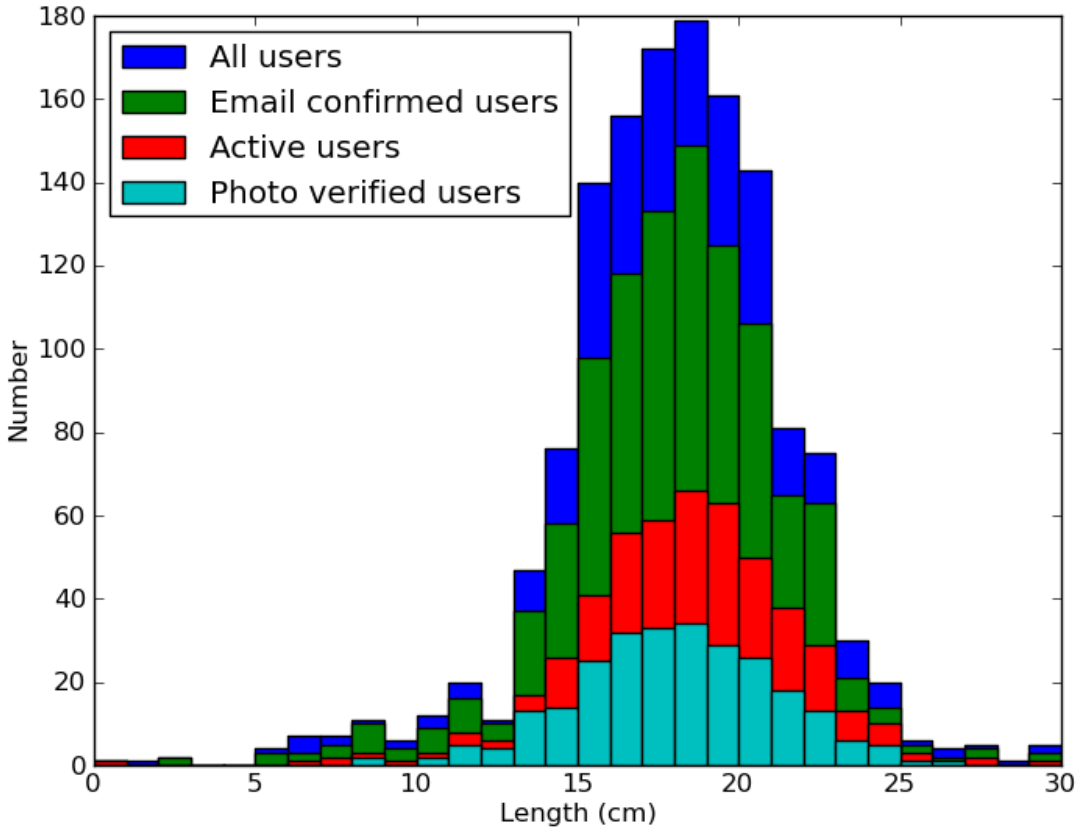

Figure 1: Histogram of penis length, in centimetres, with 1 cm width bins. Odd features, such as an excess at 8–9 cm, are diminished with each verification level. The overall distribution remains roughly constant, suggesting that there is not a strong correlation between size and verification. The total range of verified lengths is 8–27 cm (approximately 3–11 inches).

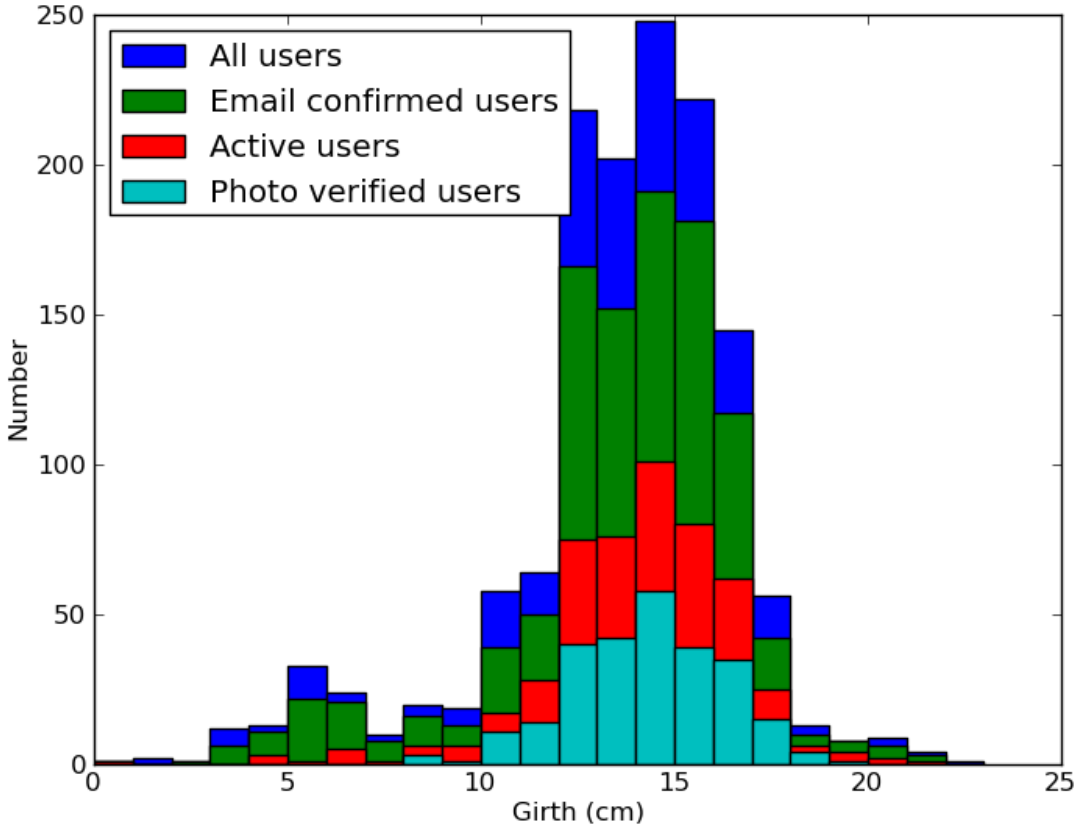

Figure 2: Histogram of penis girth (i.e., circumference of the shaft), with 1 cm width bins. Similar to length, odd features diminish with each verification level. The total range in verified girth is 8–20 cm (approximately 3–8 inches). The equivalent range in diameters is 1–2.5 inches.

We will discuss whether this is a likely effect further in the next section, though for now one can already note that the distribution is nearly symmetric, and that the peak remains constant as a function of verification level. As such, it is unlikely that we are missing a significant proportion of small men, nor is there any correlation with how much effort a man is willing to put into being verified on a site such as CSC and the mean size.

There are, however, some features of the distribution which merit additional attention. In particular, both length and girth show bumps at small numbers. The most likely explanation for these is that users are incorrectly entering their size in inches rather than centimetres. For length, the excess is at between 8 to 9 cm, which would be an impressive length if in inches. The bump in girth is much more substantial around 5 to 7 cm, which would correspond to a diameter of less than an inch, which possible though unlikely.

Based only on values reported at registration, it would be reasonable to exclude any lengths less than 9 cm and any girths less than 7 cm as being due to user error. However, it is noticeable that both these excesses disappear when the users are verified. It seems that these mistakes are weeded out naturally. Similarly, extremely large sizes are less likely to be verified, which suggests that these are men who were exaggerating their size and are unwilling to continue in that lie.[1]

Based on this evidence, instead of applying arbitrary cuts on the data, we will consider the "photo verified" subset to be accurate, and will be used in all further analysis unless otherwise noted. Comparisons made between the verified subset and the larger sets can be used to estimate the effect of biases in self-reported data.

2.3 Whole number bias

Upon closer inspection of the individual measurements that contribute to the total data set, it is evident that there is a bias to report only whole number measurements. It can clearly be seen in figure 3 that comparatively few people will report a fractional length.

[1]This is a phenomenon which comes up repeatedly in comparing cock size; Though everybody wishes they were bigger and will try to claim that they are, when it comes down to it, all men seem to accept that

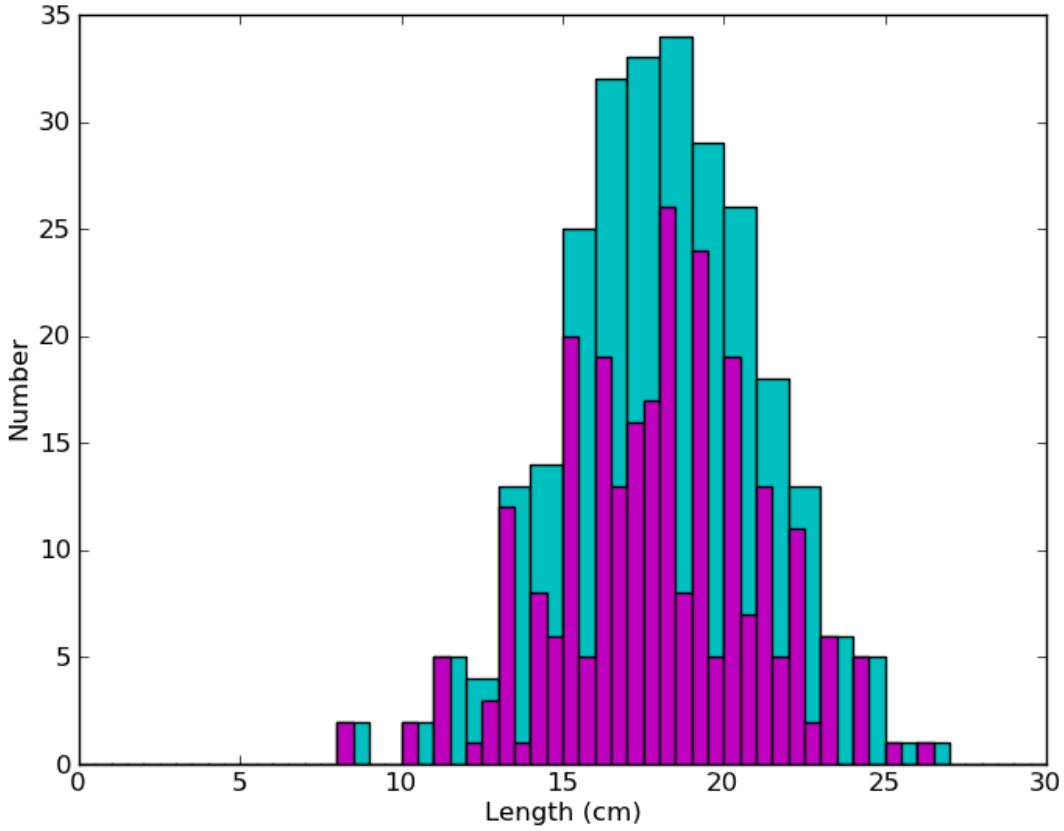

Figure 3: The histogram of photo verified length, this time shown with both 1 cm bins and 0.5bins. Since each bin includes the lower bound but not the upper bound, it can be seen that lengths with a half centimetre portion are significantly under reported.

While we have not yet investigated whether lengths are normally distributed, it appears that this bias in measurements will distort the results. The most likely cause is that users tend to round up to the nearest centimetre rather than report a length to the nearest 5 mm. Thus, the histogram bins $x \leq l(x + .5\,\text{cm})$, where x is a whole number measurement in centimetres, actually contain a large number of points from $(x - .5\,\text{cm}) < l < x$. It is unknown, and difficult to guess, whether those who measure just a few millimetres more than a full centimetre will round down, round up to the half centimetre, or round up all the way to the next centimetre.

Interestingly, the only range for which more people report lengths at the half-centimetre point than the neighbouring whole number bins is $17.5\,\text{cm} \leq l18\,\text{cm}$. It is unknown why this might be. Our first hypothesis, that 17.5 cm represented a significant milestone in the more commonly used imperial system compared to 17 cm, does not seem likely—both are slightly under 7 inches. Another possibility is that, since this is near the mode of the distribution (i.e., the peak), people are more interested in gaining every last millimetre then can. This is the point in the distribution where a single millimetres represents gaining an advantage over more people than any other.

To compensate for this bias, the most conservative route would be to reduce all lengths by 0.5 cm under the assumption that everybody rounds up. However, it is unlikely that the majority of those a few millimetres above a whole centimetre round up to the next half centimetre, since if the lengths really are normally distributed the 0.5 cm histogram would still remain smooth. This 0.5 cm bias is more likely to only affect those points which like in the whole number bins. Alternatively, one could look only at measurements that end in 0.5 cm without any compensating counter-bias, under the assumption that these are more accurate and therefore more trustworthy.

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their actual size is a fact of life that can't be changed.

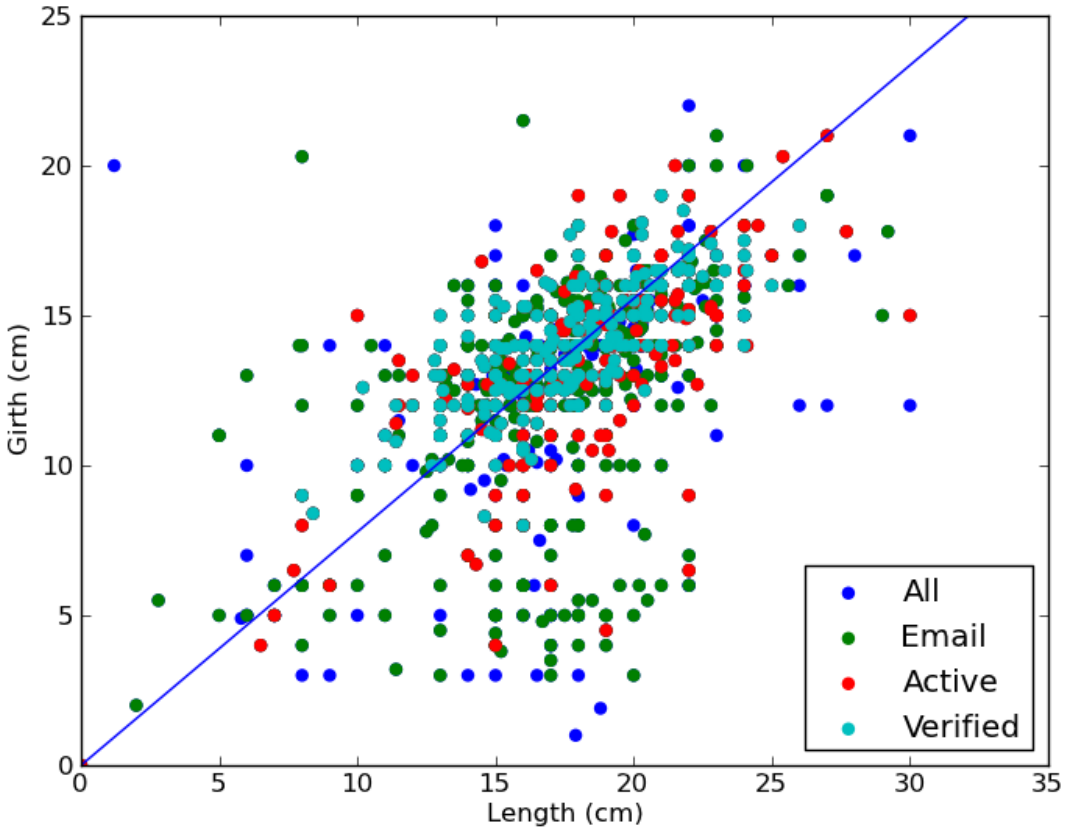

Figure 4: Penis size measurements plotted as length vs. girth. The colours of the points match the colour schemes used in earlier plots, with each point having the colour of the most restricted set it appears in (i.e., all photo verified points are cyan). The line has a slope of 0.77832 and is the best fit to the photo verified subset.

3 Data analysis

3.1 Length-girth correlation

One interesting question we might ask before studying the distributions of length, girth, and total size (i.e., volume), is whether length and girth are correlated. The individual measurements are graphed in figure 4.

Outliers from the less restrictive data sets are very obvious here. The correlation coefficients are 0.54, 0.55, 0.67, and 0.73, from the least to most restricted sets. The equation of the best fit line is $g = 0.77832l$, but the scatter in g is generally at least 5 cm, making length

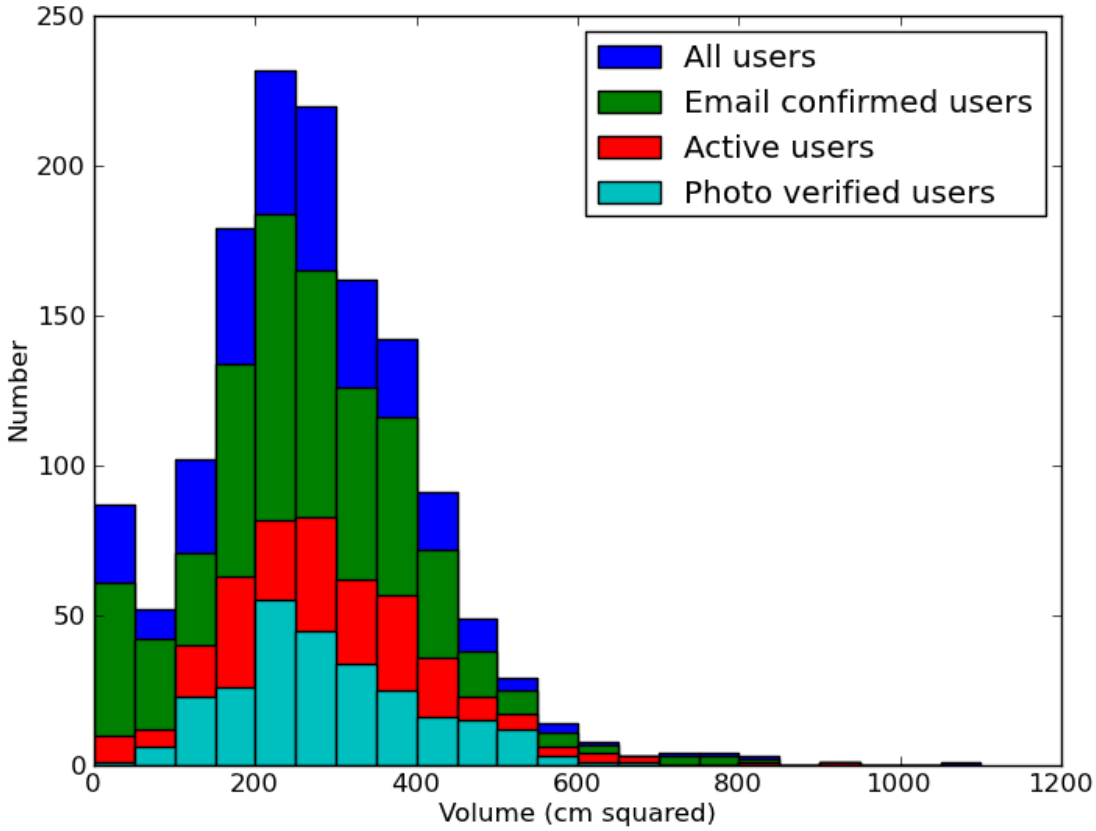

Figure 5: Histogram of volumes, derived from length and girth measurements displayed previously, using 50 cm^2 bins.

a poor predictor of girth, and similarly vise versa.

3.2 Volume

Due to the combined effects that girth is difficult to estimate and that it contributes as girth-squared, the volume of the penis is difficult to measure. Nonetheless, it represents the most complete quantification of size and is this used as the metric by which users at CSC are compared.

The histogram of volumes of CSC users is shown in figure 5. Like the histograms of the independent quantities, there is a bump at very low values that is reduced with further verification steps. Unlike previous histograms, volume shows a tail to high values.

		Statistics			Gaussian fit	
Data subset	Number	Mean	Median	Std. Dev	x_o	σ
All users	1383	17.61	18.00	3.53	18.16 ± 0.08	2.06 ± 0.06
Email confirmed	1064	17.65	18.00	3.46	18.23 ± 0.07	2.04 ± 0.05
Active users	500	17.95	18.00	3.34	18.44 ± 0.05	2.12 ± 0.04
Photo verified	263	17.73	18.00	3.09	18.08 ± 0.07	2.16 ± 0.05
Photo verified (cm)	128	17.84	18.00	3.41	18.05 ± 0.27	2.49 ± 0.18
Photo verified (mm)	135	17.62	17.70	2.75	17.23 ± 0.15	1.84 ± 0.11

Table 1: Basic statistics and Gaussian fit of length data, including subsets of the photo verified data based on precision of reported measurement, where (cm) denotes only measurements for which both length and girth are whole centimetres, and (mm) denotes where at least one measurement was reported to the nearest millimetre.

		Statistics			Gaussian fit	
Data subset	Number	Mean	Median	Std. Dev	x_o	σ
All users	1383	13.20	14.00	3.07	14.3 ± 0.1	1.43 ± 0.07
Email confirmed	1064	13.31	14.00	2.99	14.3 ± 0.1	1.42 ± 0.07
Active users	500	13.76	14.00	2.44	14.37 ± 0.07	1.42 ± 0.05
Photo verified	263	13.97	14.00	1.96	14.37 ± 0.08	1.42 ± 0.06
Photo verified (cm)	128	13.92	14.00	2.01	14.03 ± 0.11	1.38 ± 0.08
Photo verified (mm)	135	14.01	14.00	1.91	13.72 ± 0.11	1.43 ± 0.08

Table 2: Basic statistics and Gaussian fit of girth data with the same subsets as described in table 1.

4 Distribution

The null hypothesis is that penis size follows a normal (Gaussian) distribution. Tables 1 and 2 lists the number of measurements for each the data set and various simple statistics for length and girth, respectively. With increasing verification levels, mean length does not show a significant trend, while mean girth rises, suggesting that girth is typically underestimated. The median of both measures is constant, while the standard deviation decreases for both, suggesting that increased verification eliminates outliers on both ends of the distribution.

Also shown in these tables are the the best-fit Gaussian parameters for the distribution. This fit is the best approximation of the actual mean x_o and standard deviation σ from

which these measurements are drawn. Both parameters are constant with verification level, within error, reinforcing the conclusion that there is not a significant bias in selecting men who are willing to be active members of a site such as CSC. It is interesting that x_o and σ are not equal to the mean and standard deviation of the entire data set, suggesting that the distribution is either not truly Gaussian or at least still contains outliers. Figures 6 and 7 show these fits for the photo verified subsets of length and girth respectively.

The distinction between the precision of the data sets, described as whole number bias above, is important. The Gaussian fits show the fits to the full photo verified data set using the bins shown in figures 1 and 2. We have also tried a Gaussian fit to only those who reported both length and girth rounded to the nearest centimetre and assumed an error of ± 5 mm. For both length and girth, the Gaussian fit parameters of the distribution shows a trend to smaller values when limited to measurements reported with 1 mm accuracy. This supports the theory that there is a bias to round up to the nearest centimetre rather than round down when appropriate. Since we believe measurements accurate to 1 mm will not have this bias, we consider this subset of measurements most representative of the real population.

There are a couple oddities which remain in the photo verified data which merit some discussion. One of these is a deficit compared to the expected value from the Gaussian fit in length in the 12 cm bin, which can be seen in Figure 6. This is likely due to the fact that 13 cm, the beginning of the next bin, is equal to about 5 inches. It seems that men who measure 12 or 12.5 cm (just under 5 inches) tend to want to over estimate their own size such that they do not have to suffer the humiliation of having a 4 inch penis. The the subset with 1 mm accuracy, there is an even more pronounced deficit in the 18 cm bin and an excess in the 20 cm bin. It seems possibly that those who measure in the 18 cm range tend to bump themselves up to 20 cm, though this is a very large exaggeration of almost a full inch. There is not a corresponding whole inch milestone in this range.

The Gaussian fit to girth, seen in Figure 7, is not as good, but other than difficulty in measuring girth, there is not an obvious explanation for any of the features seen.

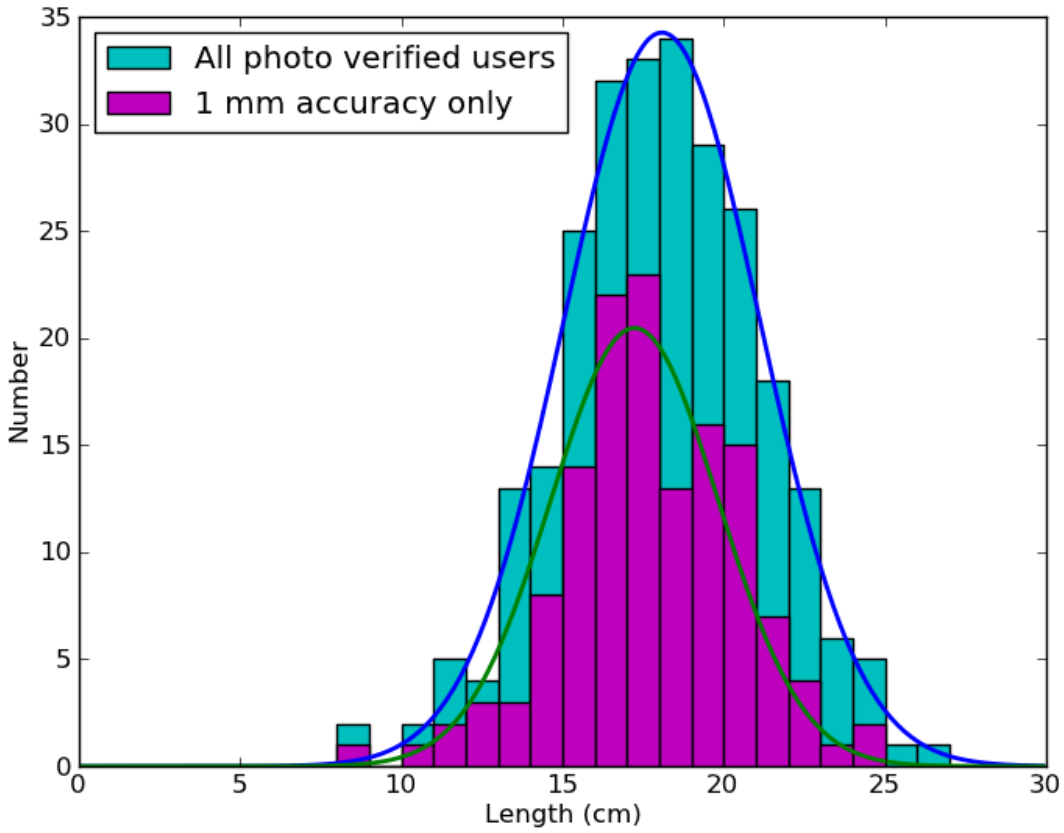

Figure 6: Best-fit normal Gaussian distribution for length of photo verified users.

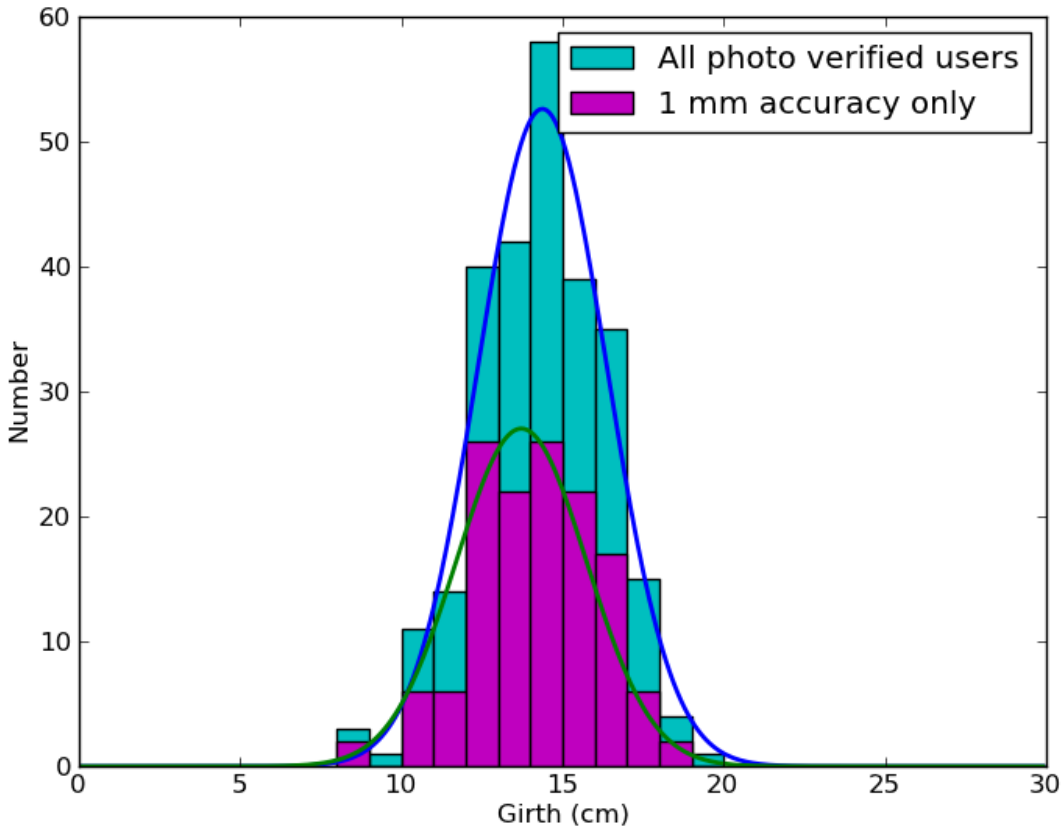

Figure 7: Best-fit of normal Gaussian distribution for girth of photo verified users.

Data subset	W	p-value
All users	0.96	4.4e-18
Email confirmed	0.96	2.6e-15
Active users	0.98	2.7e-07
Photo verified	0.99	3.0e-01
Photo verified (cm)	0.99	2.7e-01
Photo verified (mm)	0.99	4.4e-01

Table 3: Shapiro test results for the null hypothesis.

Given the above discussion, we should try to test the hypothesis that the length and girth follow a normal distribution more directly. To do so, we conduct the Shapiro-Wilk test. The results are shown in Table 3. The statistic W measures the likelihood that the data comes from a normal distribution. The p-value indicates the significance of the result. For all data subsets, W is close to one, though for all but the photo verified subset the p-value is very small (¡0.05), so these results are not considered significant. The low significance is likely due to incorrect measurements and other outliers discussed previously. However, for the photo verified subset, the $p = 0.30$, indicating that the null hypothesis can not be rejected. As expected, the 1 cm accuracy data is marginally less definitive ($p = 0.27$) while the 1 mm data is stronger at ($p = 0.44$). The Anderson-Darling test, not shown here, also indicated that only the photo verified data set was likely to come from a true normal distribution.

5 Conclusion

We have shown that the length and girth data from photo verified CSC users follows a normal (Gaussian) distribution. Lesser levels of verification exhibit features which are not consistent with a Gaussian, but the basic statistics (including mean, standard deviation, and Gaussian parameters) are not significantly biased by these features.

For this study, the only data from users used is their length and girth. No other information, such as race, height, weight, or age, is included. As such there may be additional correlations that are undetected here.

Using the Gaussian fit as an indicator of the true underlying distribution of human penis size among adult men, we find the average length is 17.23 ± 0.15 cm with a standard deviation of 1.8 ± 0.1 cm. Similarly, the average girth is 13.7 ± 0.1 cm with standard deviation of 1.43 ± 0.08 cm. Based on this data, it seems evident that the average penis length commonly reported is indeed significantly understated. Approximately 68% of the population should fall within one standard deviation of the average (about 16–19 cm or 6.25–7.5 inches) and should be considered "normal". Those who are two standard deviations above this, i.e. greater than about 21 cm (8.25 inches) in length, comprise less than 3% of the population and certainly deserve the title "hung", while on the opposite end of the spectrum those less than about 13.5 cm (5.5 inches) are equally rare and should be recognized as "small".

Appendix A: Unit conversion

As discussed, a common problem in measuring penis size is getting the units right. To convert from inches to centimetres, one must only multiply by 2.54. The conversion between girth and radius is

$$G = 2\pi R \tag{1}$$

where G is the girth and R is the radius. To calculate volume, use

$$V = \pi R^2 L = \frac{G^2}{4\pi} L \tag{2}$$

where V is volume and L is length. One must be careful to use the same units for all values. Table 4 lists the conversion between centimetres and inches, as well as the equivalent diameter assuming the given girth.

Length (cm)	Length (in)	Equiv. Diameter (cm)	Equiv. Diameter (in)
1	0.39	0.32	0.13
2	0.79	0.64	0.25
3	1.18	0.95	0.38
4	1.57	1.27	0.50
5	1.97	1.59	0.63
6	2.36	1.91	0.75
7	2.76	2.23	0.88
8	3.15	2.55	1.00
9	3.54	2.86	1.13
10	3.94	3.18	1.25
11	4.33	3.50	1.38
12	4.72	3.82	1.50
13	5.12	4.14	1.63
14	5.51	4.46	1.75
15	5.91	4.77	1.88
16	6.30	5.09	2.01
17	6.69	5.41	2.13
18	7.09	5.73	2.26
19	7.48	6.05	2.38
20	7.87	6.37	2.51
21	8.27	6.68	2.63
22	8.66	7.00	2.76
23	9.06	7.32	2.88
24	9.45	7.64	3.01
25	9.84	7.96	3.13
26	10.24	8.28	3.26
27	10.63	8.59	3.38
28	11.02	8.91	3.51
29	11.42	9.23	3.63
30	11.81	9.55	3.76

Table 4: The first two columns show the conversion between centimetres and inches. The last two columns show the diameter of the penis given the girth shown in the first column.

Appendix B: Embarrassment threshold number

One natural question to ask, and the one that motivates a lot of this discussion for individuals, is "where do I stack up?". Another way of putting this is to ask, given a group of guys, what are the chances that I am the smallest (or biggest) guy in the room? Just for fun, let's call the minimum number other of guys required in a group before there's at least a 50% chance at least one guy is smaller than you the "embarrassment threshold". With fewer guys than the embarrassment threshold, chances are you're the smallest one in the room. While a more in-depth analysis could use any of length, girth, or volume to calculate this number, we will limit ourselves to the most readily used (i.e., easiest to see in a locker room) metric: length. These numbers are tabulated below.

Length (cm)	Length (inches)	Percentile	Embarrassment threshold
7.0	2.8	1.3e-06	77025390
8.0	3.1	2.55e-05	3920816
9.0	3.5	0.000376	265793
10.0	3.9	0.00418	23948
11.0	4.3	0.035	2860
12.0	4.7	0.222	451
13.0	5.1	1.07	93
14.0	5.5	3.94	25
15.0	5.9	11.3	8
16.0	6.3	25.2	3
17.0	6.7	45	2
18.0	7.1	66.3	1
19.0	7.5	83.2	1
20.0	7.9	93.4	1
21.0	8.3	98	1
22.0	8.7	99.5	1
23.0	9.1	99.9	1
24.0	9.4	100	1
25.0	9.8	100	1

Table 5: Embarrassment threshold number for lengths from 7 cm (where you probably have one of the smallest penises in the country, not withstanding medical abnormalities) to 25 cm (where you are almost certain to win any length comparison). Also shown is the percentage of the population with a shorter length.