

Legal Data Science: Der moderne Weg zur Wahrheit

Praxisteil

Seán Fobbe

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1 Vorbereitung

1.1 R Code im Browser ausführen

- Möglichkeit 1: <https://webr.r-wasm.org/latest/>
- Möglichkeit 2: <https://www.mycompiler.io/new/r>

1.2 Bericht erstellen

Diesen Befehl ausführen um den gesamten Bericht zu erstellen. Wird nur mit dem rmarkdown package funktionieren. Kann (vermutlich) nicht mit WebR ausgeführt werden!

```
rmarkdown::render("Fobbe_2023-05-03_Praxisteil.R")
```

2 Legal Data Science: Der moderne Weg zur Wahrheit (Praxisteil)

2.1 Verteilungen

Hier werden drei verschiedene Verteilungen erstellt und gespeichert. Wir analysieren diese im Laufe des Praxisteils. Die Anzeige der numerischen Werte soll nur verdeutlichen wie aussichtslos es ist, große Zahlenmengen per Hand zu analysieren.

2.1.1 Normalverteilung

```
normal <- rnorm(1000, mean = 100, sd = 15)
```

2.1.2 Log-Normalverteilung

```
lognorm <- rlnorm(1000, meanlog = 4.47, sdlog = 0.5)
```

2.1.3 Beta-Verteilung

```
beta <- rbeta(1000, 0.2, 0.2) * 190
```

2.1.4 Werte der Normalverteilung anzeigen

```
print(normal)
```

```
## [1] 94.06973 108.37058 81.22275 102.72442 102.66102 88.82835 82.22837
## [8] 111.27829 95.70565 102.23545 75.70672 99.70695 114.64397 98.77463
## [15] 69.61162 61.07394 112.08079 95.31968 73.68679 101.42359 99.26935
## [22] 91.12397 103.00272 109.35857 114.90251 110.36977 116.33483 71.10496
## [29] 86.82400 115.38225 97.01296 79.17687 87.55372 71.52661 100.32835
## [36] 104.72135 104.25827 97.38591 101.31347 85.73457 89.27150 95.44297
## [43] 62.83819 91.72470 86.41485 121.30594 109.07383 83.20156 102.30209
## [50] 122.09247 104.66992 108.97941 118.53802 100.87649 96.70526 94.97686
## [57] 91.50432 91.94203 75.40572 97.65905 75.98420 90.94259 107.41654
## [64] 86.37815 89.22287 105.51356 84.40967 88.15866 81.58126 101.64717
## [71] 137.53558 95.17689 106.14947 103.43910 90.90538 113.09115 97.47670
## [78] 81.42955 97.34701 114.54899 99.18296 69.06248 98.50456 69.42900
## [85] 124.59908 134.86720 90.53766 93.06543 103.98560 61.82315 88.18112
## [92] 129.80842 123.16495 84.68964 63.30675 99.08216 121.08351 120.12172
## [99] 84.30300 84.12140 91.55871 102.20427 76.24106 144.07435 123.14579
## [106] 91.62163 88.29950 105.82504 92.90189 94.37171 104.47879 93.80995
## [113] 107.70249 86.82620 109.81589 111.43736 99.24717 95.62795 119.17209
## [120] 90.77680 75.49746 105.31326 74.15065 88.88425 86.43452 111.36099
## [127] 94.01472 115.26936 81.35936 114.76100 141.08014 123.13522 103.07069
```

##	[134]	103.49812	121.54256	104.77797	84.97512	148.48651	101.64169	115.99389
##	[141]	110.06010	108.49169	112.90260	88.34562	112.87834	120.00376	99.00720
##	[148]	104.93839	100.77685	127.40612	81.31464	87.08647	112.15749	78.10441
##	[155]	105.42616	92.59142	128.44092	102.24604	79.13653	71.21054	132.75836
##	[162]	81.15639	98.11829	97.18854	132.58081	112.97538	98.65266	90.39575
##	[169]	87.40764	94.68256	124.35198	95.53896	87.52940	120.33342	106.72709
##	[176]	95.96275	68.52359	70.05986	109.39748	104.71148	87.19035	87.07355
##	[183]	80.24281	102.09531	93.48736	83.21091	93.19733	94.24874	108.58296
##	[190]	125.35907	104.35317	125.85277	128.10931	90.07602	96.93564	106.51913
##	[197]	114.20150	127.49750	95.63039	105.88640	108.20278	104.86697	98.75491
##	[204]	111.72585	102.90040	111.51581	116.91563	104.53398	80.18547	99.12684
##	[211]	103.57350	80.61291	83.89404	118.81907	102.54703	121.87679	118.15648
##	[218]	93.15066	90.05915	74.87284	102.36474	130.04839	110.07648	92.42445
##	[225]	126.63743	96.57267	114.07843	106.42296	114.03769	94.48627	111.42147
##	[232]	66.92825	80.61811	91.02242	95.71694	95.54770	86.26819	101.33030
##	[239]	81.90904	69.24493	91.11624	101.77006	82.54034	104.08960	109.20973
##	[246]	104.70193	76.66958	124.25149	105.10007	101.53420	123.82567	103.03128
##	[253]	94.79620	86.77436	112.34050	103.04981	87.57579	125.04662	118.16037
##	[260]	120.00073	83.92760	90.84817	112.35962	98.84538	106.67566	126.69992
##	[267]	89.12653	94.27048	104.76611	103.26485	104.98014	111.84964	92.78190
##	[274]	90.51324	110.95596	101.50181	115.85379	81.82605	70.05486	88.09804
##	[281]	104.77376	70.01172	118.65880	105.80959	71.08641	92.60466	148.17581
##	[288]	92.00149	86.11459	98.94128	106.97008	105.17844	111.02099	112.58879
##	[295]	114.79276	145.59445	118.04273	84.58767	110.34021	131.65143	109.49905
##	[302]	102.06896	79.25639	103.25109	113.13691	126.86611	107.80405	78.76387
##	[309]	108.59121	79.76005	76.85534	95.98216	110.09362	123.18735	82.44896
##	[316]	104.48296	91.19481	105.89134	99.92247	71.66034	127.89448	94.01776
##	[323]	94.56316	84.17903	107.83352	100.87722	97.06911	96.64282	91.01664
##	[330]	103.20827	97.12048	134.99784	98.77134	73.76312	106.42993	97.40199
##	[337]	76.68338	86.72253	92.83496	97.33694	83.31004	116.65726	71.47693
##	[344]	91.89907	96.19686	94.91836	101.76127	87.82966	105.09712	111.50224
##	[351]	99.30579	94.05819	111.22186	103.91023	79.76880	100.36991	107.59353
##	[358]	118.37284	101.75868	114.57109	74.84124	116.67485	88.06921	106.81862
##	[365]	110.38262	126.87776	112.29918	65.88027	89.45982	87.67974	113.38421
##	[372]	96.52250	90.85455	103.08530	84.57558	111.13096	117.59486	69.08319
##	[379]	115.64800	93.75435	64.02777	106.51842	96.94834	86.64695	108.45679
##	[386]	96.52299	107.88144	110.65018	107.99378	88.12491	114.31898	122.37006
##	[393]	120.09395	97.42855	88.25471	73.86548	99.29713	99.26673	85.94495
##	[400]	104.97003	111.04848	92.76504	97.28358	126.06473	102.40407	92.01904
##	[407]	107.92271	98.03488	103.93213	100.08687	128.38121	81.12667	80.82865
##	[414]	129.12175	96.97067	116.58831	112.58428	88.58519	106.85392	100.72522
##	[421]	98.77784	104.84520	113.89116	105.70817	102.12424	110.51893	86.79366
##	[428]	114.26385	90.07616	88.57749	80.65807	115.38835	99.76289	132.63905
##	[435]	95.41865	136.98372	105.82264	117.76567	102.56223	114.25062	94.02181
##	[442]	84.43638	98.27178	122.78122	85.04687	106.84269	112.47086	98.51464
##	[449]	99.63945	80.63641	98.13767	115.55745	83.06451	87.61625	91.34357
##	[456]	83.46852	91.23071	70.88424	111.39590	111.65716	98.07097	74.80944
##	[463]	130.02561	78.32361	89.06554	79.73054	94.02120	74.90672	99.97753
##	[470]	102.08578	119.72606	97.42333	110.44801	106.89874	106.75854	81.10800
##	[477]	124.47120	101.69277	128.25419	102.99159	128.73897	110.85356	116.62794
##	[484]	99.18172	101.18075	92.96770	93.76583	91.55332	139.50984	109.45428
##	[491]	113.63306	109.53861	112.61763	95.14653	92.67112	98.74053	90.01250
##	[498]	78.53163	104.09564	78.59267	116.27215	91.57804	78.93085	73.96075
##	[505]	96.97271	108.23423	79.44148	122.89359	117.65699	101.46945	97.78482
##	[512]	102.79592	113.90297	103.65959	124.83838	91.98278	78.80468	107.41479
##	[519]	91.43692	96.54744	86.40145	108.75490	87.70847	118.86644	96.25456

##	[526]	107.32938	81.78814	96.60568	92.53790	115.71848	87.45103	111.03841
##	[533]	90.81984	98.52242	100.10368	127.64952	104.16277	105.82426	117.67843
##	[540]	120.81601	71.24555	102.68221	125.54288	84.55949	94.72967	99.81419
##	[547]	98.54637	57.71046	124.66177	100.43430	92.47929	122.72237	112.50188
##	[554]	106.30539	87.18838	81.80973	65.17456	98.94453	103.14164	96.01189
##	[561]	115.79870	42.88623	129.12944	105.58006	105.02125	86.56036	110.85643
##	[568]	91.28030	81.06969	107.89948	77.69618	113.06002	96.14994	103.58459
##	[575]	96.42799	126.35181	98.40312	86.13006	115.85468	104.38153	117.90498
##	[582]	92.58613	102.54876	92.69748	82.72789	78.02913	103.80229	90.61398
##	[589]	136.75458	72.56836	108.47768	99.03815	110.11260	103.49270	88.82183
##	[596]	92.57265	118.09682	92.24618	114.75810	101.61212	97.25417	79.10935
##	[603]	75.91118	93.26732	88.47424	107.37187	136.84651	84.72514	112.89934
##	[610]	86.11061	89.14024	95.07617	87.34781	100.46611	87.64427	137.99275
##	[617]	80.63227	117.26487	115.40231	97.52548	95.72986	101.12144	143.98975
##	[624]	74.30877	89.03417	97.38272	84.40149	121.54285	121.91404	125.21968
##	[631]	100.14595	107.27986	83.94247	108.56110	104.33795	99.81541	119.43475
##	[638]	97.95088	107.76055	108.63301	115.27919	91.57825	115.23912	82.35770
##	[645]	95.63424	66.71576	130.42445	118.54817	105.60553	91.86366	100.53218
##	[652]	108.64417	108.74825	99.96187	110.63925	112.57280	110.78979	105.38893
##	[659]	91.14573	96.87809	114.16994	112.42157	104.45610	109.12694	111.03502
##	[666]	88.46241	88.36030	116.01373	119.04949	76.57466	137.80278	105.65619
##	[673]	112.01246	69.82925	101.35102	93.43099	116.84306	104.64427	91.26923
##	[680]	87.62353	90.39731	83.01193	80.26481	75.08039	86.76457	87.57931
##	[687]	104.22157	99.58489	118.76694	92.04614	87.51979	116.90444	98.80284
##	[694]	84.81885	100.65007	97.72452	99.65596	124.88919	87.84240	121.54588
##	[701]	100.97562	112.55601	111.74063	104.56317	99.94874	77.33866	106.60019
##	[708]	73.54385	101.86613	106.83748	115.91238	97.83604	108.65599	107.17837
##	[715]	127.09239	90.31761	113.12169	89.70110	77.66093	80.01622	82.00176
##	[722]	105.75257	79.77771	91.55558	124.92382	74.81595	96.34480	118.34944
##	[729]	118.51726	109.67926	95.61584	94.81459	79.40952	99.72893	87.76747
##	[736]	104.44102	85.30425	108.83188	104.94102	105.33093	91.45668	110.48955
##	[743]	124.07882	86.63469	88.91781	68.09438	120.32347	121.44573	108.40102
##	[750]	114.43799	101.43702	104.00681	106.79276	118.04177	97.93448	126.43282
##	[757]	103.02283	114.90591	118.50289	85.73622	109.33947	110.66941	103.75792
##	[764]	67.65836	95.20197	120.92202	106.22292	91.70909	102.72593	87.35567
##	[771]	119.02718	70.06148	102.54322	77.04055	93.22392	82.92402	129.84364
##	[778]	106.51776	101.66385	109.12502	102.27826	107.46266	75.36916	109.18498
##	[785]	99.86866	84.41905	114.13994	111.64728	80.97572	116.09759	133.08189
##	[792]	128.75468	118.39837	96.36905	84.12360	105.75297	89.09241	85.21522
##	[799]	123.29242	104.22441	50.53669	86.76087	101.01398	134.10084	92.50346
##	[806]	127.63908	59.08341	89.28255	98.85983	87.83663	87.67423	109.10778
##	[813]	96.02296	108.90475	100.16148	78.64436	95.07140	116.16804	100.25151
##	[820]	84.17529	90.20408	103.27959	94.11685	104.85776	102.48466	100.07207
##	[827]	96.36974	84.44679	106.39993	118.65152	102.40305	92.28744	107.94519
##	[834]	109.58258	113.71077	93.48058	111.58500	107.41310	119.03351	104.42746
##	[841]	97.46796	106.21543	86.20941	110.15381	99.95296	102.16769	92.61718
##	[848]	99.07254	104.28153	105.09379	85.91973	113.67647	73.67426	82.46724
##	[855]	83.25172	85.11345	94.92323	100.92746	109.49853	100.60577	78.43942
##	[862]	95.04843	108.62384	94.94783	90.98158	103.88258	112.77382	100.81035
##	[869]	123.12055	98.66620	76.66552	85.49814	121.39376	126.69027	105.37418
##	[876]	72.34841	127.49772	115.52518	99.82625	95.65583	123.94237	61.68872
##	[883]	108.66552	118.26238	83.44214	93.77027	110.26526	113.03030	76.26583
##	[890]	101.16598	82.38742	91.04617	101.56418	92.60098	99.00813	112.55676
##	[897]	87.84601	79.64794	105.76862	85.58440	89.88325	136.72962	99.45297
##	[904]	118.05307	105.82474	94.31785	129.34798	116.77904	86.56109	87.32189
##	[911]	125.39217	108.17569	102.72536	102.94767	117.51897	125.53999	96.57831

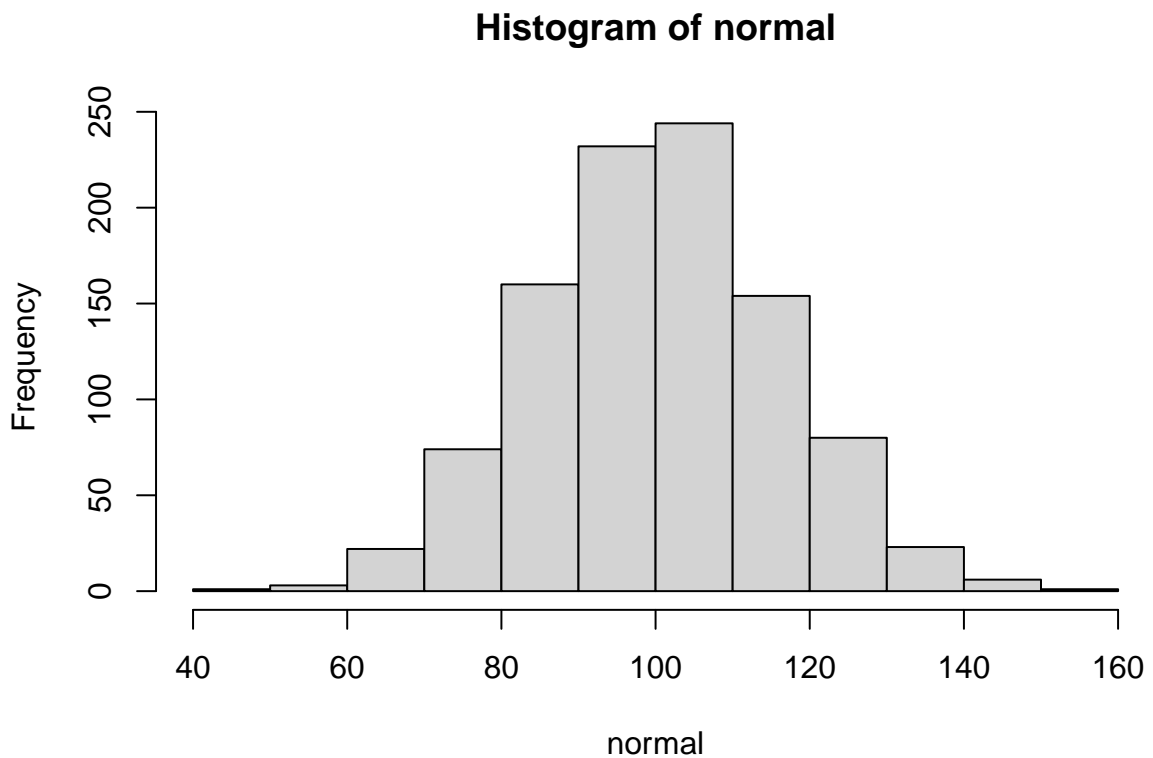
##	[918]	112.84142	124.04302	83.68150	88.26250	72.25653	114.32304	134.46219
##	[925]	94.40387	105.57763	95.05086	94.02455	81.94964	73.43511	95.30178
##	[932]	109.87869	100.14525	87.77260	120.78257	131.40989	109.28831	87.53433
##	[939]	123.40721	116.01291	86.22812	109.37009	138.56280	87.72367	90.32986
##	[946]	78.97748	88.22146	105.67094	106.20136	96.60910	98.75508	110.85514
##	[953]	98.37874	89.88236	96.97493	101.91147	95.87570	97.81056	80.30571
##	[960]	95.08785	79.23502	103.00784	107.56915	84.07065	93.14679	81.58453
##	[967]	134.13283	69.88812	76.08668	99.74393	126.68870	93.12576	101.18808
##	[974]	121.31340	106.64855	106.84492	121.45763	116.40276	79.75420	105.20578
##	[981]	106.74539	68.53982	118.81935	120.89223	113.63182	84.33969	123.47564
##	[988]	115.76565	81.46787	104.60558	97.80480	154.85952	103.30102	88.04619
##	[995]	75.34154	85.57773	66.40728	70.80754	107.62515	91.78206	

2.2 Histogramme

Histogramme teilen die Bandbreite einer numerischen Variable in gleichmäßige Klassen auf und zeigen an, wie häufig diese vorkommen. Histogramme sind eine hervorragende Möglichkeit um die grobe Verteilung einer Variable abzuschätzen.

2.2.1 Histogramm: Normalverteilung

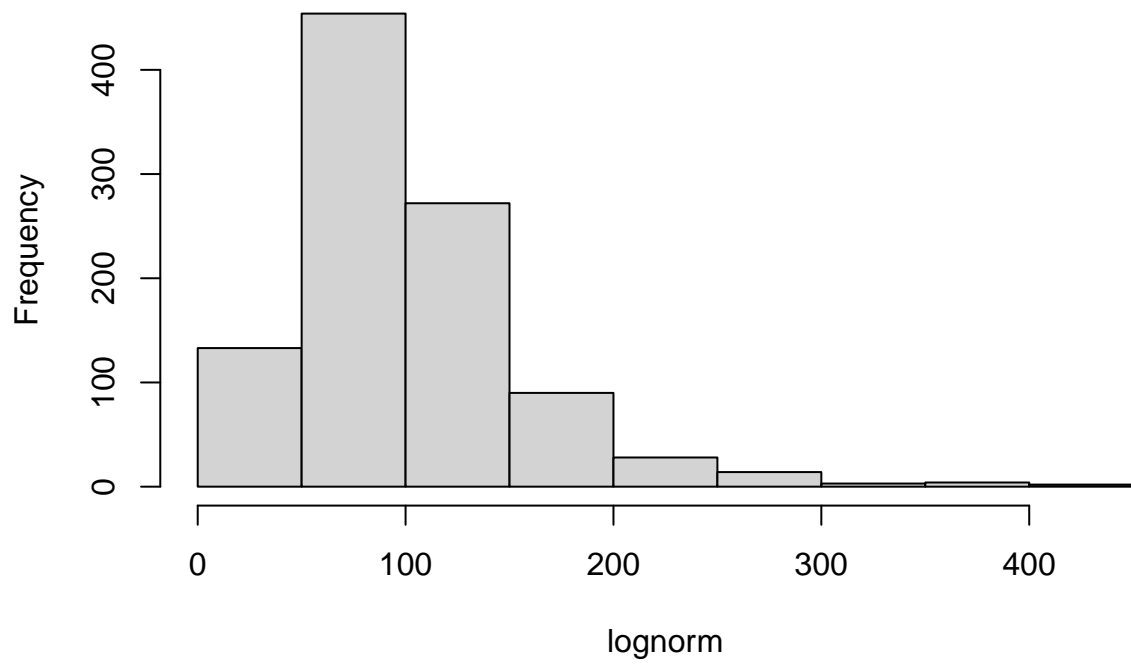
```
hist(normal)
```



2.2.2 Histogramm: Log-Normalverteilung

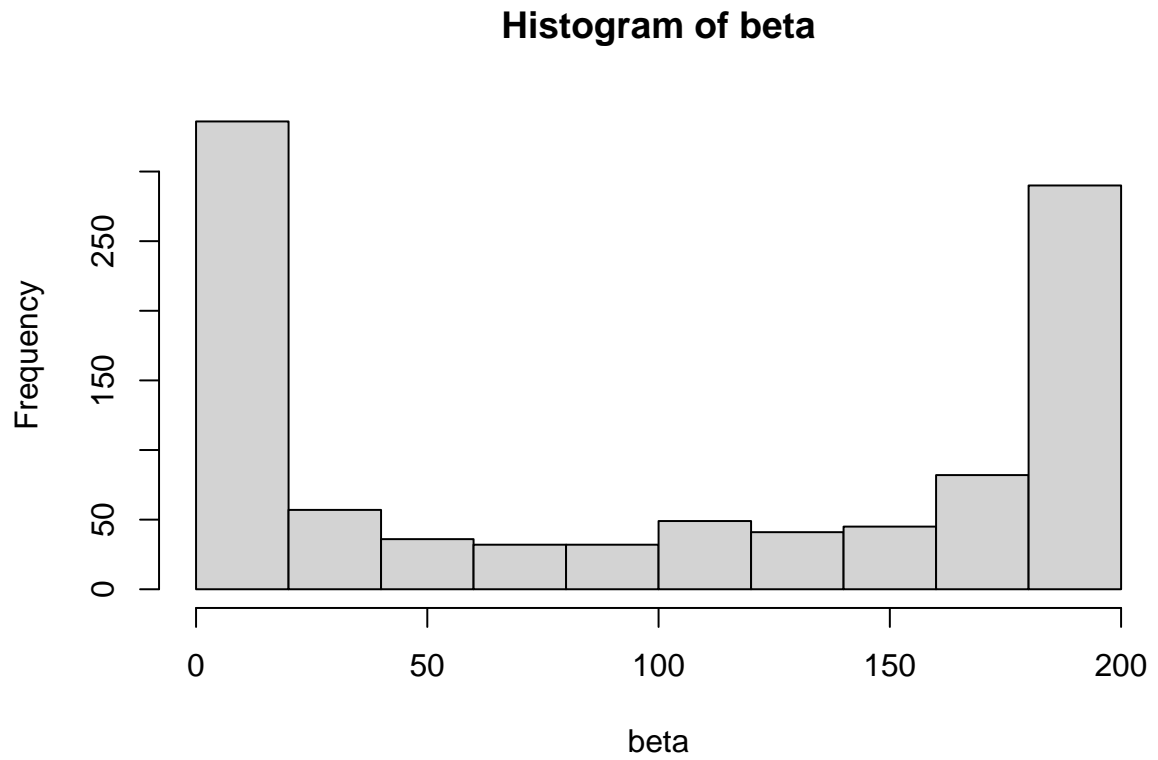
```
hist(lognorm)
```

Histogram of lognorm



2.2.3 Histogramm: Beta-Verteilung

```
hist(beta)
```



2.3 Lagemaße

Lagemaße zeigen bestimmte Kennwerte für eine Variable an. Sie sind mit Vorsicht zu interpretieren, denn sie reduzieren eine komplexe Verteilung sehr stark. `summary()` zeigt Minimum, Maximum, Median, Mittelwert und 1. bzw. 3. Quartil an.

2.3.1 Lagemaße: Normalverteilung

```
summary(normal)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  42.89   89.09  100.35  100.32  110.65  154.86
```

2.3.2 Übungsaufgabe Lagemaße

Bestimmen Sie die Lagemaße der Variablen “lognorm” und “beta”!

2.4 Stichproben: Intuition

2.4.1 Mittelwert der echten Verteilung

```
mean(lognorm)
```

```
## [1] 100.7393
```

2.4.2 Mittelwert einer Stichprobe

Probieren Sie diese Zeile mehrfach nacheinander! So bekommen Sie ein Gefühl für die Varianz um den wahren Mittelwert, der durch die Unsicherheit der Stichprobenziehung erzeugt wird.

```
mean(sample(lognorm, 100))
```

```
## [1] 102.5453
```

```
mean(sample(lognorm, 100))
```

```
## [1] 94.79199
```

```
mean(sample(lognorm, 100))
```

```
## [1] 99.67758
```

```
mean(sample(lognorm, 100))
```

```
## [1] 95.54351
```

```
mean(sample(lognorm, 100))
```

```
## [1] 102.8006
```

2.5 Stichproben: Vergleich von Zufallsstichprobe und willkürlicher Stichprobe

In diesem Abschnitt ziehen wir sowohl eine echte Zufallsstichprobe, als auch eine willkürliche (sortierte) Stichprobe und vergleichen deren Mittelwerte. Die Zufallsstichprobe ist sehr nah am echten Mittelwert, die willkürliche Stichprobe hoffnungslos daneben.

2.5.1 Verteilung sortieren

```
lognorm.sort <- sort(lognorm)
```

2.5.2 Willkuerliche Stichprobe: Ziehen

```
sample.opportunity <- lognorm.sort[1:100]
```

2.5.3 Willkuerliche Stichprobe: Anzeigen

```
print(sample.opportunity)
```

```
## [1] 19.17496 20.33344 23.31577 24.16276 24.31777 26.54334 27.83186 28.41666
## [9] 28.65053 28.98035 29.25939 29.38025 29.56261 29.58277 29.81155 30.02494
## [17] 30.19667 31.11398 31.14093 31.56446 31.95920 32.06925 32.26577 32.60005
## [25] 32.61072 32.77217 32.80223 32.85907 33.61016 33.62131 34.07878 34.56488
## [33] 34.75762 34.94137 35.18245 35.41737 35.83919 36.51112 36.53854 36.61533
## [41] 36.99123 37.21307 37.64054 37.70059 37.77591 37.84358 37.88105 38.23106
## [49] 38.36353 38.55491 38.63940 38.82271 38.90061 38.99082 39.00141 39.18535
## [57] 39.28049 39.28614 39.40840 39.51760 39.94349 40.16024 41.11448 41.26002
## [65] 41.44038 41.45911 41.48781 41.79763 42.45922 42.47426 42.86083 42.89378
## [73] 42.95184 43.06747 43.12109 43.14883 43.23845 43.25674 43.30187 43.41416
## [81] 43.47063 43.59164 43.61373 43.92270 44.07103 44.72591 44.74470 44.82634
## [89] 45.26428 45.31611 45.41610 45.47305 45.55601 45.57051 45.79702 45.86635
## [97] 46.00370 46.16805 46.17399 46.34474
```

2.5.4 Willkuerliche Stichprobe: Mittelwert

```
mean(sample.opportunity)
```

```
## [1] 37.50978
```

2.5.5 Zufaellige Stichprobe: Ziehen

```
sample.random <- sample(lognorm.sort, 100)
```

2.5.6 Zufällige Stichprobe: Mittelwert berechnen

```
mean <- mean(sample.random)
```

2.5.7 Zufällige Stichprobe: Mittelwert anzeigen

```
print(mean)
```

```
## [1] 101.081
```

2.6 Übung: US Judge Ratings

2.6.1 Vorbemerkung

Der Datensatz “USJudgeRatings” ist in R vorinstalliert und enthält von Anwäl:innen vergebene Bewertungen von 43 US-Amerikanischen Richter:innen eines US Superior Courts. Die genaue Herkunft der Daten ist nicht zu rekonstruieren, die Ergebnisse sollten also nicht ernst genommen werden. Für Übungszwecke ist er jedoch hilfreich und gibt Ihnen einen Vorgeschmack auf “echte” Daten.

2.6.2 US Judge Ratings: Gesamten Datensatz anzeigen

```
print(USJudgeRatings)
```

```
##          CONT INTG DMNR DILG CFMG DECI PREP FAMI ORAL WRIT PHYS RTEN
## AARONSON,L.H.  5.7  7.9  7.7  7.3  7.1  7.4  7.1  7.1  7.1  7.0  8.3  7.8
## ALEXANDER,J.M.  6.8  8.9  8.8  8.5  7.8  8.1  8.0  8.0  7.8  7.9  8.5  8.7
## ARMENTANO,A.J.  7.2  8.1  7.8  7.8  7.5  7.6  7.5  7.5  7.3  7.4  7.9  7.8
## BERDON,R.I.    6.8  8.8  8.5  8.8  8.3  8.5  8.7  8.7  8.4  8.5  8.8  8.7
## BRACKEN,J.J.   7.3  6.4  4.3  6.5  6.0  6.2  5.7  5.7  5.1  5.3  5.5  4.8
## BURNS,E.B.    6.2  8.8  8.7  8.5  7.9  8.0  8.1  8.0  8.0  8.0  8.6  8.6
## CALLAHAN,R.J. 10.6  9.0  8.9  8.7  8.5  8.5  8.5  8.5  8.6  8.4  9.1  9.0
## COHEN,S.S.    7.0  5.9  4.9  5.1  5.4  5.9  4.8  5.1  4.7  4.9  6.8  5.0
## DALY,J.J.     7.3  8.9  8.9  8.7  8.6  8.5  8.4  8.4  8.4  8.5  8.8  8.8
## DANNEHY,J.F.  8.2  7.9  6.7  8.1  7.9  8.0  7.9  8.1  7.7  7.8  8.5  7.9
## DEAN,H.H.     7.0  8.0  7.6  7.4  7.3  7.5  7.1  7.2  7.1  7.2  8.4  7.7
## DEVITA,H.J.   6.5  8.0  7.6  7.2  7.0  7.1  6.9  7.0  7.0  7.1  6.9  7.2
## DRISCOLL,P.J.  6.7  8.6  8.2  6.8  6.9  6.6  7.1  7.3  7.2  7.2  8.1  7.7
## GRILLO,A.E.   7.0  7.5  6.4  6.8  6.5  7.0  6.6  6.8  6.3  6.6  6.2  6.5
## HADDEN,W.L.JR. 6.5  8.1  8.0  8.0  7.9  8.0  7.9  7.8  7.8  7.8  8.4  8.0
## HAMILL,E.C.   7.3  8.0  7.4  7.7  7.3  7.3  7.3  7.2  7.1  7.2  8.0  7.6
## HEALEY,A.H.   8.0  7.6  6.6  7.2  6.5  6.5  6.8  6.7  6.4  6.5  6.9  6.7
## HULL,T.C.     7.7  7.7  6.7  7.5  7.4  7.5  7.1  7.3  7.1  7.3  8.1  7.4
## LEVINE,I.     8.3  8.2  7.4  7.8  7.7  7.7  7.7  7.8  7.5  7.6  8.0  8.0
## LEVISTER,R.L.  9.6  6.9  5.7  6.6  6.9  6.6  6.2  6.0  5.8  5.8  7.2  6.0
## MARTIN,L.F.   7.1  8.2  7.7  7.1  6.6  6.6  6.7  6.7  6.8  6.8  7.5  7.3
## MCGRATH,J.F.  7.6  7.3  6.9  6.8  6.7  6.8  6.4  6.3  6.3  6.3  7.4  6.6
## MIGNONE,A.F.  6.6  7.4  6.2  6.2  5.4  5.7  5.8  5.9  5.2  5.8  4.7  5.2
## MISSAL,H.M.   6.2  8.3  8.1  7.7  7.4  7.3  7.3  7.3  7.2  7.3  7.8  7.6
## MULVEY,H.M.   7.5  8.7  8.5  8.6  8.5  8.4  8.5  8.5  8.4  8.4  8.7  8.7
## NARUK,H.J.    7.8  8.9  8.7  8.9  8.7  8.8  8.9  9.0  8.8  8.9  9.0  9.0
## O'BRIEN,F.J.  7.1  8.5  8.3  8.0  7.9  7.9  7.8  7.8  7.8  7.7  8.3  8.2
## O'SULLIVAN,T.J. 7.5  9.0  8.9  8.7  8.4  8.5  8.4  8.3  8.3  8.3  8.8  8.7
## PASKEY,L.     7.5  8.1  7.7  8.2  8.0  8.1  8.2  8.4  8.0  8.1  8.4  8.1
## RUBINOW,J.E.  7.1  9.2  9.0  9.0  8.4  8.6  9.1  9.1  8.9  9.0  8.9  9.2
## SADEN,G.A.    6.6  7.4  6.9  8.4  8.0  7.9  8.2  8.4  7.7  7.9  8.4  7.5
## SATANIELLO,A.G. 8.4  8.0  7.9  7.9  7.8  7.8  7.6  7.4  7.4  7.4  8.1  7.9
## SHEA,D.M.     6.9  8.5  7.8  8.5  8.1  8.2  8.4  8.5  8.1  8.3  8.7  8.3
## SHEA,J.F.JR.  7.3  8.9  8.8  8.7  8.4  8.5  8.5  8.5  8.4  8.4  8.8  8.8
## SIDOR,W.J.    7.7  6.2  5.1  5.6  5.6  5.9  5.6  5.6  5.3  5.5  6.3  5.3
## SPEZIALE,J.A.  8.5  8.3  8.1  8.3  8.4  8.2  8.2  8.1  7.9  8.0  8.0  8.2
## SPONZO,M.J.   6.9  8.3  8.0  8.1  7.9  7.9  7.9  7.7  7.6  7.7  8.1  8.0
```

```
## STAPLETON,J.F. 6.5 8.2 7.7 7.8 7.6 7.7 7.7 7.7 7.5 7.6 8.5 7.7
## TESTO,R.J. 8.3 7.3 7.0 6.8 7.0 7.1 6.7 6.7 6.7 6.7 8.0 7.0
## TIERNEY,W.L.JR. 8.3 8.2 7.8 8.3 8.4 8.3 7.7 7.6 7.5 7.7 8.1 7.9
## WALL,R.A. 9.0 7.0 5.9 7.0 7.0 7.2 6.9 6.9 6.5 6.6 7.6 6.6
## WRIGHT,D.B. 7.1 8.4 8.4 7.7 7.5 7.7 7.8 8.2 8.0 8.1 8.3 8.1
## ZARRILLI,K.J. 8.6 7.4 7.0 7.5 7.5 7.7 7.4 7.2 6.9 7.0 7.8 7.1
```

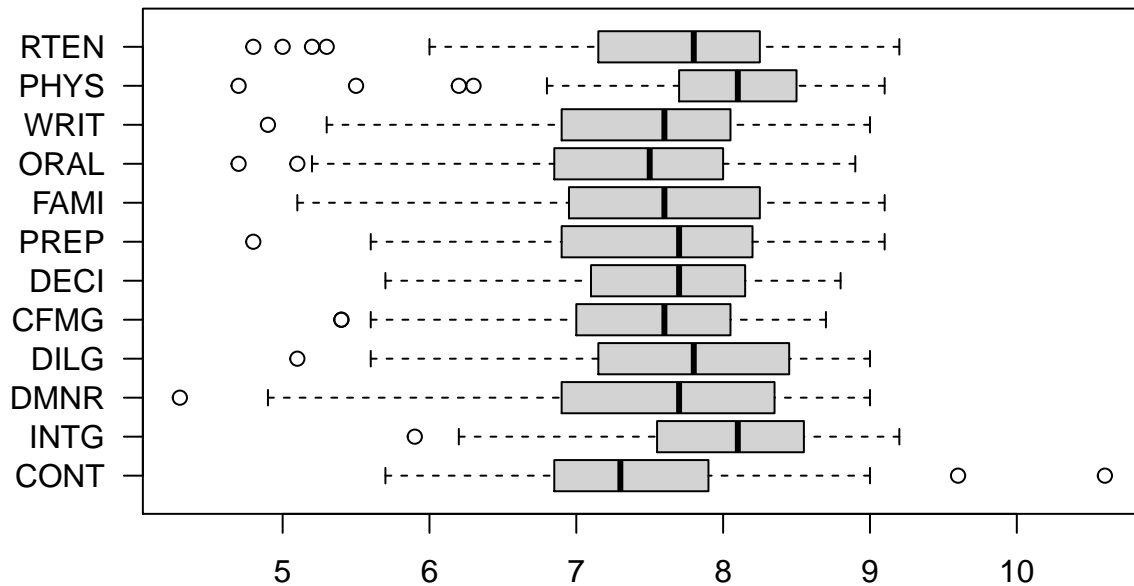
2.6.3 US Judge Ratings: Zusammenfassende Statistiken

```
summary(USJudgeRatings)
```

```
##          CONT          INTG          DMNR          DILG
## Min.   : 5.700   Min.   :5.900   Min.   :4.300   Min.   :5.100
## 1st Qu.: 6.850   1st Qu.:7.550   1st Qu.:6.900   1st Qu.:7.150
## Median : 7.300   Median :8.100   Median :7.700   Median :7.800
## Mean   : 7.437   Mean   :8.021   Mean   :7.516   Mean   :7.693
## 3rd Qu.: 7.900   3rd Qu.:8.550   3rd Qu.:8.350   3rd Qu.:8.450
## Max.   :10.600   Max.   :9.200   Max.   :9.000   Max.   :9.000
##          CFMG          DECI          PREP          FAMI
## Min.   :5.400   Min.   :5.700   Min.   :4.800   Min.   :5.100
## 1st Qu.:7.000   1st Qu.:7.100   1st Qu.:6.900   1st Qu.:6.950
## Median :7.600   Median :7.700   Median :7.700   Median :7.600
## Mean   :7.479   Mean   :7.565   Mean   :7.467   Mean   :7.488
## 3rd Qu.:8.050   3rd Qu.:8.150   3rd Qu.:8.200   3rd Qu.:8.250
## Max.   :8.700   Max.   :8.800   Max.   :9.100   Max.   :9.100
##          ORAL          WRIT          PHYS          RTEN
## Min.   :4.700   Min.   :4.900   Min.   :4.700   Min.   :4.800
## 1st Qu.:6.850   1st Qu.:6.900   1st Qu.:7.700   1st Qu.:7.150
## Median :7.500   Median :7.600   Median :8.100   Median :7.800
## Mean   :7.293   Mean   :7.384   Mean   :7.935   Mean   :7.602
## 3rd Qu.:8.000   3rd Qu.:8.050   3rd Qu.:8.500   3rd Qu.:8.250
## Max.   :8.900   Max.   :9.000   Max.   :9.100   Max.   :9.200
```

2.6.4 US Judge Ratings: Boxplot

```
boxplot(USJudgeRatings, horizontal = TRUE, las = 1)
```

2.6.5 US Judge Ratings: Zugriff auf Variablen

Mit `attach()` sparen wir es uns jedesmal den Datensatz zu benennen, d.h. `hist(USJudgeRatings$INTG)` wird einfach nur zu `hist(INTG)`

```
attach(USJudgeRatings)
```

```
## The following objects are masked from USJudgeRatings (pos = 3):
##
##   CFMG, CONT, DECI, DILG, DMNR, FAMI, INTG, ORAL, PHYS, PREP, RTEN,
##   WRIT
```

```
## The following objects are masked from USJudgeRatings (pos = 4):
##
##   CFMG, CONT, DECI, DILG, DMNR, FAMI, INTG, ORAL, PHYS, PREP, RTEN,
##   WRIT
```

```
## The following objects are masked from USJudgeRatings (pos = 5):
##
##   CFMG, CONT, DECI, DILG, DMNR, FAMI, INTG, ORAL, PHYS, PREP, RTEN,
##   WRIT
```

```
## The following objects are masked from USJudgeRatings (pos = 6):
##
##   CFMG, CONT, DECI, DILG, DMNR, FAMI, INTG, ORAL, PHYS, PREP, RTEN,
##   WRIT
```

```
## The following objects are masked from USJudgeRatings (pos = 7):  
##  
##     CFMG, CONT, DECI, DILG, DMNR, FAMI, INTG, ORAL, PHYS, PREP, RTEN,  
##     WRIT
```

```
## The following objects are masked from USJudgeRatings (pos = 8):  
##  
##     CFMG, CONT, DECI, DILG, DMNR, FAMI, INTG, ORAL, PHYS, PREP, RTEN,  
##     WRIT
```

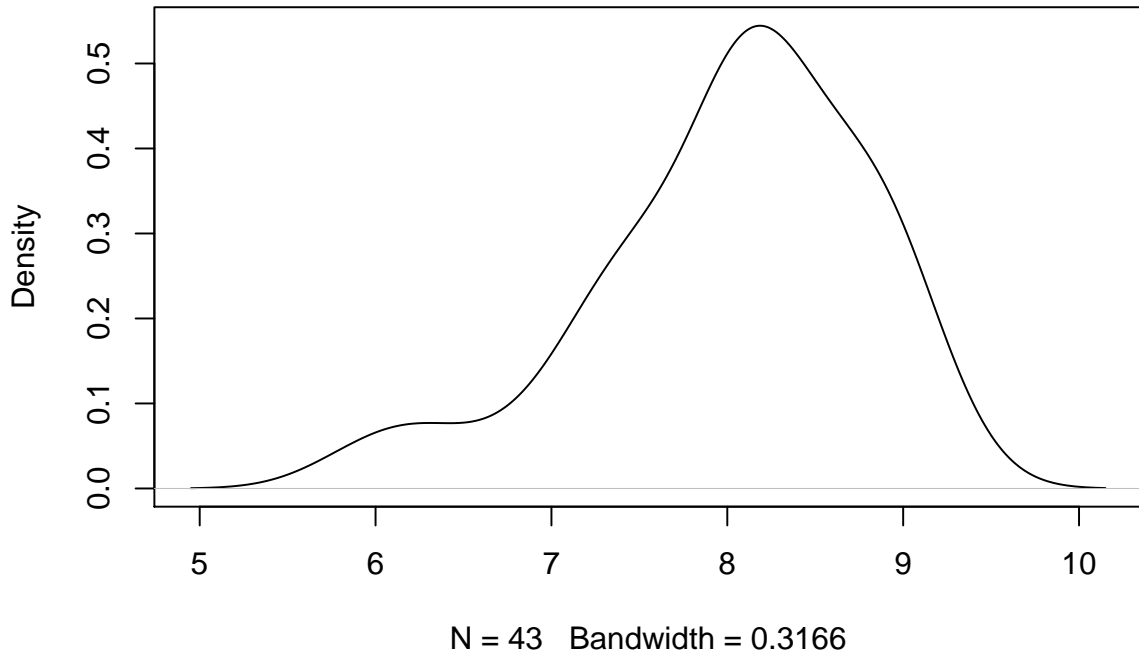
```
## The following objects are masked from USJudgeRatings (pos = 9):  
##  
##     CFMG, CONT, DECI, DILG, DMNR, FAMI, INTG, ORAL, PHYS, PREP, RTEN,  
##     WRIT
```

```
## The following objects are masked from USJudgeRatings (pos = 10):  
##  
##     CFMG, CONT, DECI, DILG, DMNR, FAMI, INTG, ORAL, PHYS, PREP, RTEN,  
##     WRIT
```

2.6.6 Verteilung: INTG

```
plot(density(INTG))
```

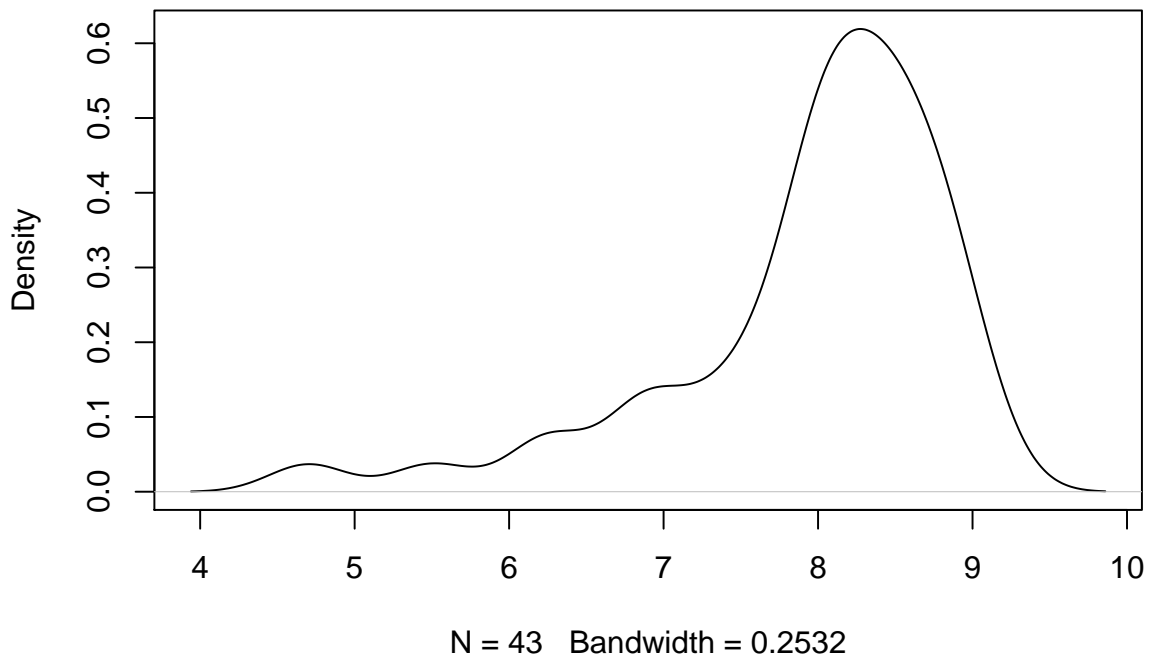
density.default(x = INTG)



2.6.7 Verteilung: PHYS

```
plot(density(PHYS))
```

density.default(x = PHYS)



2.6.8 Übungsaufgabe

Probieren Sie Density Charts mit anderen Variablen aus!