Statistical Model To Predict The Weight Of Newborns

Enrico Michelon

Introduction

This project concerns the creation of a statistical model to predict the weight of newborns. Our objective is to create a statistical model given the *neonati.csv* dataset that can be extended to the entire population.

Table 1: Dataset first rows

Anni.madre	N.gravidanze	Fumatrici	Gestazione	Peso	Lunghezza	Cranio	Tipo.parto	Ospedale	Sesso
26	0	0	42	3380	490	325	Nat	osp3	M
21	2	0	39	3150	490	345	Nat	osp1	F
34	3	0	38	3640	500	375	Nat	osp2	M
28	1	0	41	3690	515	365	Nat	osp2	M
20	0	0	38	3700	480	335	Nat	osp3	F
32	0	0	40	3200	495	340	Nat	osp2	F

Dataset

The dataset is composed by 2500 samples and, studing its first rows, we can distinguish 10 variables: Anni.madre, N.gravidanze, Fumatrici, Gestazione, Peso, Lunghezza, Cranio, Tipo.parto, Ospedale and Sesso.

Anni.madre

Anni.madre is a quantitative variable on radio scale. In the dataset we have at least two outlayers, which can be found at rows 1152 and 1380, and report an age of 1 and 0, respectively. Computing position measures and standard deviation excluding those rows, we obtain:

Table 2: Position measures and standard deviation for Anni.madre

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	std.dev
13	25	28	28.19	32	46	5.22

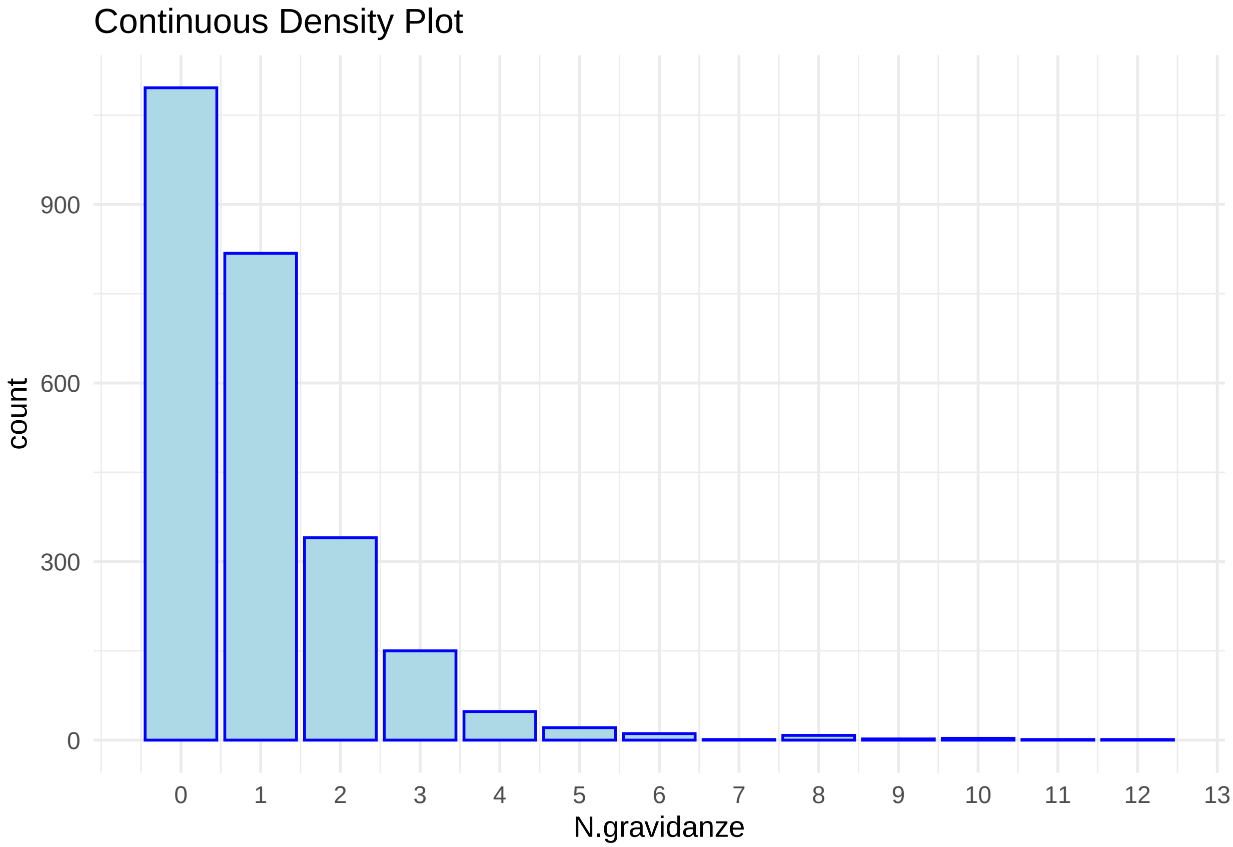
N.gravidanze

N.gravidanze is a quantitative variable on ratio scale. In Table 3 position measures and standard deviation for the variable are shown. We can see that mean and standard deviation and third interquartile are around 1 (0.98, 1.28 and 1 respectively), while the maximum reaches a value of 12.

Table 3: Position measures and standard deviation for Anni.madre

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	std.dev
0	0	1	0.98	1	12	1.28

We can look now at the distribution of *N.gravidanze*. From the graphic we can notice that it is a normal positive skewed distribution, with mean 0.98 and standard deviation of 1.28.



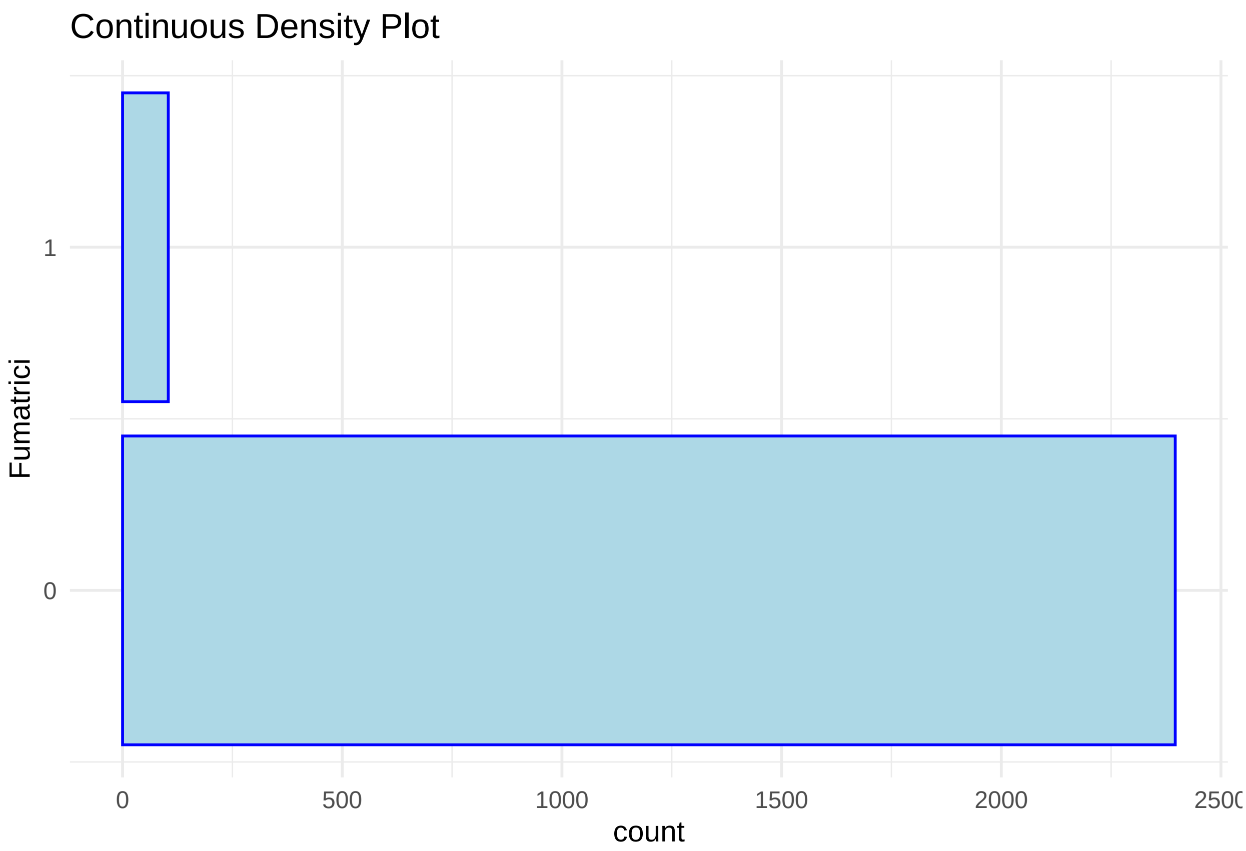
Fumatrici

Fumatrici is a qualitative encoded variable on nominal scale, with values 0 and 1. Value 0 means that the mother is not a smoker, while mothers with “Fumatrici” value of 1 means she is a smoker. In Table 4 we can observe measures of position and standard deviation.

Table 4: Position measures and standard deviation for Fumatrici

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	std.dev
0	0	0	0.04	0	1	0.2

Media of 0.04, means that the 60% of the mothers are not smokers. We can also observe it from the next figure.



Gestazione

Gestazione is a quantitative variable on ratio scale, measured in weeks, with position and standard deviation measures that can be seen in Table 5. As we expect, the mean value is around 40 weeks (38.98), with a low standard deviation of 1.87 weeks.

Table 5: Position measures and standard deviation for Gestazione

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	std.dev
25	38	39	38.98	40	43	1.87

Peso

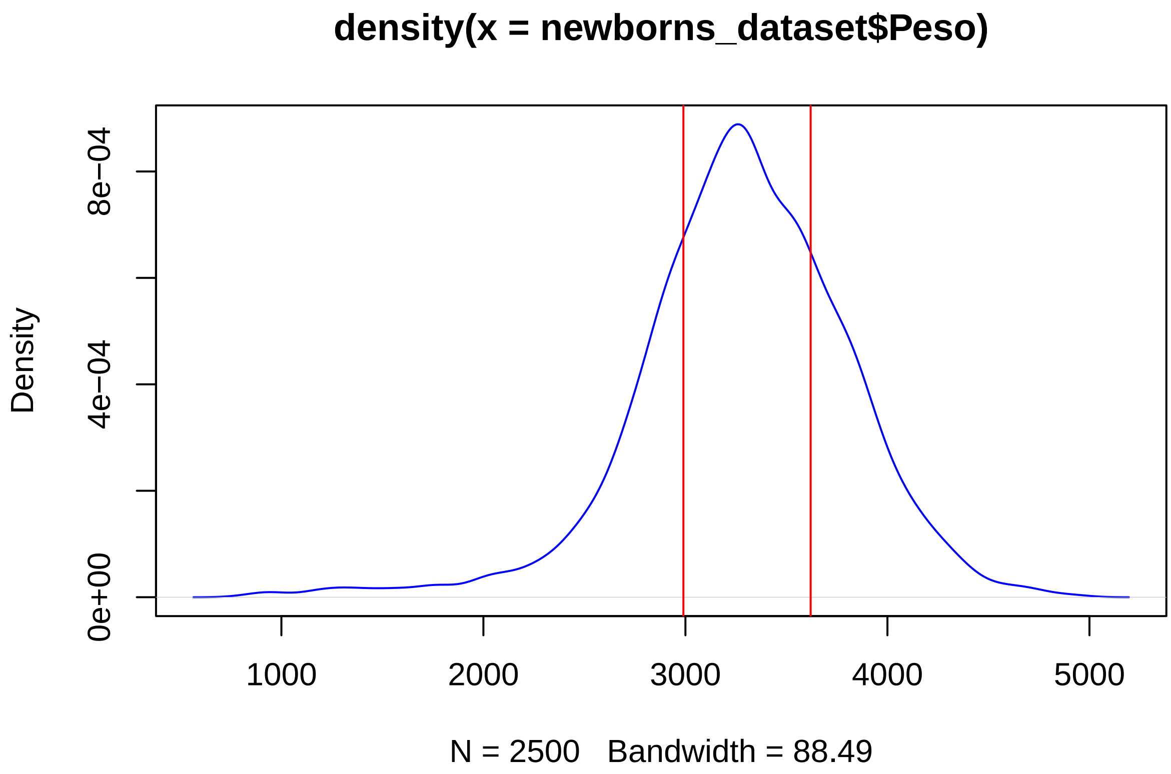
Peso is a quantitative variable on ratio scale, and represents the weight of newborns in grams. Position measures and standard deviation are observable in Table 6.

Table 6: Position measures and standard deviation for Peso

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	std.dev
830	2990	3300	3284.08	3620	4930	525.04

```
[1] 630
```

It is interesting to note that “Peso” has in IQR value of 630 grams, while the range is of 4100. This can been explained studing the graphic on Figure 3. The distribution is a Normal distribution, negatively skewed, with very long tails, expecially on the left, making a large different between IQR (represented by red line on the graphic) and range.



```
[1] -0.6470308
```

Lunghezza

Cranio

Tipo.parto

Ospedale

Sesso