

Batch Normalization

Normalizing inputs

How do you normalize the data?

1. First, let's have another brief look at the Deep Learning timeline



- a. In this chapter, we will be looking at Batch Normalization and Dropout, which in some sense come under the topic of “**Better Regularization**”
2. Before we talk about Batch Normalization, let us first recap on how we normalize/standardize inputs. **The terms normalization & standardization are used interchangeably**

x_i (where):
i: Training example number
j: feature number

Launch (within 6 months)	x_{11}	x_{21}	x_{31}	x_{41}	x_{51}	x_{61}	x_{71}	x_{81}	x_{91}
Weight (g)	151	180	160	205	162	182	138	185	170
SAR Value	0.64	0.87	0.67	0.88	0.7	0.91	0	1	0.47
dual sim	x_{14}	x_{24}	x_{34}	x_{44}	x_{54}	x_{64}	x_{74}	x_{84}	x_{94}
Internal memory (≥ 64 GB, 4GB RAM)	1	1	1	1	1	1	1	1	1
NFC	0	1	1	0	1	0	1	1	1
Radio	1	0	0	1	1	1	0	0	0
Battery(mAh)	3060	3500	3060	5000	3000	4000	1960	3700	3260
Price (INR)	15k	32k	25k	18k	14k	12k	35k	42k	44k
Like (y)	1	0	1	0	1	1	0	1	0

- a. We normalize the data using the following formula:

- i. $x_{ij}^{(norm)} = \frac{x_{ij} - \mu_j}{\sigma_j}$ for each feature of each training sample.

- ii. Where mean: $\mu_j = \frac{1}{m} \sum_{i=1}^m x_{ij}$

- iii. And Variance/Standard deviation: $\sigma_j = \sqrt{\frac{1}{m} \sum_{i=1}^m (x_{ij} - \mu_j)^2}$