1 The problem

We have a number of sources and each source has a count of the traffic to their website spread across various devices e.g Apple iPhone 8, Samsung Galaxy Note 8 etc. We would like to find out what is the percentage of the presence of each brand of mobile phone (e.g Apple, Samsung, Oppo etc.) in the data that we have. Each hit is **unique within each source**. (Note: Each count of traffic is one unique device.)

Table 1: Example

Model	**Source 1**	**Source 2**	**Source 3**
y	x_1	x_2	x_3
y_1	a_{11}	a_{12}	a_{13}
y_2	a_{21}	a_{22}	a_{23}
y_3	a_{31}	a_{32}	a_{33}

Basic explanation of variables

- Each x_i is a source
- Each y_i is a model/device
- Each a_{ii} is a count of the model/device for each source

1.1 Method used

1. Sum up each column to get the sum of all devices for each source.

$$s_i = a_{1i} + a_{2i} + a_{3i} \quad \text{for } i = 1, 2, 3$$

Table 2: Example

Model	**Source 1**	**Source 2**	**Source 3**
y	x_1	x_2	x_3
y_1	a_{11}	a_{12}	a_{13}
y_2	a_{21}	a_{22}	a_{23}
y_3	a_{31}	a_{32}	a_{33}
Sum	s_1	s_2	s_3

2. Take the total of the sums $t = s_1 + s_2 + s_3$, then we get the weight of each source

$$w_i = \frac{s_i}{t}, \quad \text{for } i = 1, 2, 3$$

Table 3: Example

Model	**Source 1**	**Source 2**	**Source 3**
y	x_1	x_2	x_3
y_1	a_{11}	a_{12}	a_{13}
y_2	a_{21}	a_{22}	a_{23}
y_3	a_{31}	a_{32}	a_{33}
Sum	s_1	s_2	s_3
Weight	w_1	w_2	w_3

3. Multiply weight (w_i) to count (a_{ii}) and sum them up for each device

$$\alpha_i = w_1 \times a_{i1} + w_2 \times a_{i2} + w_3 \times a_{i3}$$

Table 4: Example

Model	**Source 1**	**Source 2**	**Source 3**	**weighted**
y	x_1	x_2	x_3	**sum**
y_1	a_{11}	a_{12}	a_{13}	α_1
y_2	a_{21}	a_{22}	a_{23}	α_2
y_3	a_{31}	a_{32}	a_{33}	α_3
Sum	s_1	s_2	s_3	
Weight	w_1	w_2	w_3	

4. Then we get the percentage (p_i) of each model

$$p_i = \frac{\alpha_i}{\alpha_1 + \alpha_2 + \alpha_3} \times 100, \quad \text{for } i = 1, 2, 3$$

Table 5: Example

Model y	**Source 1** x_1	**Source 2** x_2	**Source 3** x_3	**weighted sum**	**% of each model**
y_1	a_{11}	a_{12}	a_{13}	α_1	p_1
y_2	a_{21}	a_{22}	a_{23}	α_2	p_2
y_3	a_{31}	a_{32}	a_{33}	α_3	p_3
Sum	s_1	s_2	s_3		
Weight	w_1	w_2	w_3		

5. Then you separate them by brands and sum their respective percentages (p_i) to get the brand breakdown.