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Separation Example

Note: In the joint probability tables below C represents the classification of the problem, Y represents the label(i.e the ground truth), and A represents the gender.

C	Y	A	P(A,Y,C)
NO	NO	Male	0.096
NO	YES	Male	0.064
YES	NO	Male	0.028
YES	YES	Male	0.012
NO	NO	Female	0.384
NO	YES	Female	0.256
YES	NO	Female	0.112
YES	YES	Female	0.048

In the probability table above $P(A|Y) = P(A|YC)$ which implies separation, but $P(A|C) \neq P(A|CY)$ so sufficiency is not satisfied.

Sufficiency Example

C	Y	A	P(A,Y,C)
NO	NO	Male	0.14
NO	YES	Male	0.105
YES	NO	Male	0.108
YES	YES	Male	0.009
NO	NO	Female	0.21
NO	YES	Female	0.245
YES	NO	Female	0.162
YES	YES	Female	0.021

In the probability table above $P(A|C) = P(A|CY)$ which implies sufficiency, but $P(A|Y) \neq P(A|YC)$ so separation is not satisfied.