1 Replace Missing Attribute Values

	Attributes			Decision
	Age	Hypertension	Complications	Delivery
1	?	?	none	fullterm
2	24	yes	obesity	preterm
3	28	yes	none	preterm
4	26	no	none	fullterm
5	34	yes	?	fullterm
6	?	yes	alcoholism	preterm
7	40	no	?	fullterm

Table 1: Original decision table

(a) Most common value / average

Average of Age is *30.4*

Most common value in Hypertension is *yes*

Most common value in Complications is *none*

	Attributes			Decision
	Age	Hypertension	Complications	Delivery
1	*30.4*	*yes*	none	fullterm
2	24	yes	obesity	preterm
3	28	yes	none	preterm
4	26	no	none	fullterm
5	34	yes	*none*	fullterm
6	*30.4*	yes	alcoholism	preterm
7	40	no	*none*	fullterm

Table 2: Decision table

(b) Most common value / average restricted to a concept

fullterm

Average of Age is *33.33*

Most common value in Hypertension is *no*

Most common value in Complications is *none*

preterm

Average of Age is *26*

Most common value in Hypertension is *yes*

Most common value in Complications is *obesity,none,alcoholism*

	Attributes			Decision
	Age	Hypertension	Complications	Delivery
1	*33.33*	*no*	none	fullterm
2	24	yes	obesity	preterm
3	28	yes	none	preterm
4	26	no	none	fullterm
5	34	yes	*none*	fullterm
6	*26*	yes	alcoholism	preterm
7	40	no	*none*	fullterm

Table 3: Decision table

(c) Global Closest Fit (static replacement)

$Age_{max} - Age_{min} = 40 - 24 = 16$

$d(1,2) = 1+1+1 = 3$

$d(1,3) = 1+1+0 = 2$

$d(1,4) = 1+1+0 = 2$

$d(1,5) = 1+1+1 = 3$

$d(1,6) = 1+1+1 = 3$

$d(1,7) = 1+1+1 = 3$

tie between 3 and 4 → take first closest

∴ missing attribute values in 1 are replaced by attribute values in 3

$d(5,1) = 3$

$d(5,2) = \frac{10}{16} + 0 + 1 = 1.625$

$$d(5,3) = \frac{6}{16} + 0 + 1 = 1.375$$
$$d(5,4) = \frac{9}{16} + 1 + 1 = 2.5$$
$$d(5,6) = 1 + 0 + 1 = 2$$
$$d(5,7) = \frac{6}{16} + 1 + 1 = 2.375$$

3 is the closest

$\therefore$ missing attribute values in 5 are replaced by attribute values in 3

$$d(6,1) = 3$$
$$d(6,2) = 1 + 0 + 1 = 2$$
$$d(6,3) = 1 + 0 + 1 = 2$$
$$d(6,4) = 1 + 1 + 1 = 3$$
$$d(6,5) = 2$$
$$d(6,7) = 1 + 1 + 1 = 3$$

tie between 2 and 3 $\rightarrow$ take first closest

$\therefore$ missing attribute values in 6 are replaced by attribute values in 2

$$d(7,1) = 3$$
$$d(7,2) = 1 + 1 + 1 = 3$$
$$d(7,3) = \frac{12}{16} + 1 + 1 = 2.75$$
$$d(7,4) = \frac{12}{16} + 0 + 1 = 1.875$$
$$d(7,5) = \frac{6}{16} + 1 + 1 = 2.375$$
$$d(7,6) = 3$$

4 is the closest

$\therefore$ missing attribute values in 7 are replaced by attribute values in 4

	Attributes			Decision
	Age	Hypertension	Complications	Delivery
1	28	yes	none	fullterm
2	24	yes	obesity	preterm
3	28	yes	none	preterm
4	26	no	none	fullterm
5	34	yes	none	fullterm
6	24	yes	alcoholism	preterm
7	40	no	none	fullterm

Table 4: Decision table after first iteration

All missing attribute values have been replaced.

(d) Concept Closest Fit (static replacement)

The decision table is split and the closest fit algorithm is applied to each concept separately.

fullterm

	Attributes			Decision
	Age	Hypertension	Complications	Delivery
1	?	?	none	fullterm
4	26	no	none	fullterm
5	34	yes	?	fullterm
7	40	no	?	fullterm

Table 5: Decision table for fullterm

$Age_{max} - Age_{min} = 40 - 26 = 14$

$d(1,4) = 1+1+0 = 2$

$d(1,5) = 1+1+1 = 3$

$d(1,7) = 1+1+1 = 3$

4 is the closest

$\therefore$ missing attribute values in 1 are replaced by attribute values in 4

$d(5,1) = 3$

$d(5,4) = \frac{8}{14} + 1 + 1 = 2.571$

$d(5,7) = \frac{6}{14} + 1 + 1 = 2.429$

7 is the closest

$\therefore$ missing attribute values in 5 are replaced by attribute values in 7

$d(7,1) = 3$

$d(7,4) = 1 + 0 + 1 = 2$

$d(7,5) = \frac{6}{14} + 1 + 1 = 2.429$

4 is the closest

$\therefore$ missing attribute values in 7 are replaced by attribute values in 4

	Attributes			Decision
	Age	Hypertension	Complications	Delivery
1	26	no	none	fullterm
4	26	no	none	fullterm
5	34	yes	?	fullterm
7	40	no	none	fullterm

Table 6: Decision table for fullterm after 1st iteration

There are still attribute values missing, so another iteration is needed.

$d(5,1) = \frac{8}{14} + 1 + 1 = 2.571$

$d(5,4) = \frac{8}{14} + 1 + 1 = 2.571$

$d(5,7) = \frac{6}{14} + 1 + 1 = 2.429$

7 is the closest

$\therefore$ missing attribute values in 5 are replaced by attribute values in 7

	Attributes			Decision
	Age	Hypertension	Complications	Delivery
1	26	no	none	fullterm
4	26	no	none	fullterm
5	34	yes	none	fullterm
7	40	no	none	fullterm

Table 7: Decision table for fullterm after 2nd iteration

All missing attribute values have been replaced

preterm

	Attributes			Decision
	Age	Hypertension	Complications	Delivery
2	24	yes	obesity	preterm
3	28	yes	none	preterm
6	7	yes	alcoholism	preterm

Table 8: Decision table for preterm

$Age_{max} - Age_{min} = 28 - 24 = 4$

$d(6,2) = 1 + 0 + 1 = 2$

$d(6,3) = 1 + 0 + 1 = 2$

tie between 2 and 3 → take first closest

∴ missing attribute values in 6 are replaced by attribute values in 2

	Attributes			Decision
	Age	Hypertension	Complications	Delivery
2	24	yes	obesity	preterm
3	28	yes	none	preterm
6	24	yes	alcoholism	preterm

Table 9: Decision table for preterm after 1st iteration

All missing attribute values have been replaced

	Attributes			Decision
	Age	Hypertension	Complications	Delivery
1	26	no	none	fullterm
2	24	yes	obesity	preterm
3	28	yes	none	preterm
4	26	no	none	fullterm
5	24	yes	none	fullterm
6	24	yes	alcoholism	preterm
7	40	no	none	fullterm

Table 10: Decision table