Slide07 Supplemental

Haykin Chapter 9: Self-Organizing Maps

CPSC 636-600

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Semantic Map

TABLE 9.3 Animal Names and Their Attributes

Animal		Dove	Hen	Duck	Goose	Owl	Hawk	Eagle	Fox	Dog	Wolf	Cat	Tiger	Lion	Horse	Zebra	Cow
is	small	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0
	medium	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0
	big	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
has	2 legs	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	4 legs	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
	hair	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
	hooves	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
	mane	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0
	feathers	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
likes to	hunt	0	0	0	0	1	1	1	1	0	1	1	1	1	0	0	0
	run	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	0
	fly	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
	swim	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0

- SOM can be trained with high-dimensional vectors representing multi-attributed entities such as animals.
- The resulting map could show interesting relationship among the animals.

Semantic Map: BMUs

FIGURE 9.17 Feature map containing labeled neurons with strongest responses to their respective inputs.

- The sixteen inputs are mapped to their best matching units on the map.
- Try guessing what would their neighboring units' weight vector would look like.

Semantic Map: Probed Map

FIGURE 9.18 Semantic map obtained through the use of simulated electrode penetration mapping. The map is divided into three regions representing: birds, peaceful species, and hunters.

- Find out, for each SOM unit, which animal it responds maximally.
- For this kind of probe, every unit will have an animal assigned, even when they are not the BMU for any of these animals.
- Note the partitioning of the map into coherent categories.