## Slide07 Supplemental Haykin Chapter 9: Self-Organizing Maps

CPSC 636-600 Instructor: Yoonsuck Choe Spring 2012

## Semantic Map: BMUs

1

dog	•	•	fox	•	·	cat	•	•	eagle		
•			•	·	•	•	•	•	•		
•	•	•	•	•	·	•	•	•	owl		
	•	•	•	•	•	tiger	•	•	•		
wolf	•	•		•	·	•	•	•	hawk		
•	•		lion	·	•	·	•	•	•		
·	·	·	•	•	•	•	•	•	dove		
horse	•	•	•	•	•	•	hen		•		
•	•		·	cow	•	•	•	•	goose		
zebra	·	·	•	•	•	•	duck	. •			
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**

TABLE 9	9.3 Anima	l Na	mes	and	Thei	r Att	ribut	es									
Animal		Dove	Hen	Duck	Goose	Owl	Hawk	Eagle	Fox	Dog	Wolf	Cat	Tiger	Lion	Horse	Zebra	(
	small	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	1
is	medium	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	1
	big	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	
	2 legs	1	1	1	1	1	1	1	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	
has	hair	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	
nas	hooves	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
	mane	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	
	feathers	1	1	1	1	1	1	1	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	
	run	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	
	fly	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
	swim	0	0	1	1	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.

2

## Semantic Map: Probed Map

dog	dog	fox	fox	fox	cat	cat	cat	eagle	eagle		
dog	dog	fox	fox	fox	cat	cat	cat	eagle	eagle		
wolf	wolf	wolf	fox	cat	tiger	tiger	tiger	owl	owl		
wolf	wolf	lion	lion	lion	tiger	tiger	tiger	hawk	hawk		
wolf	wolf	lion	lion	lion	tiger	tiger	tiger	hawk	hawk		
wolf	wolf	lion	lion	lion	owl	dove	hawk	dove	dove		
horse	horse \	lion	lion	lion	dove	hen	hen	dove	dove		
horse	horse	zebra	cow	cow	cow	hen	hen	dove	dove		
zebra	zebra	zebra	cow	cow	cow	hen	hen	duck	goose		
zebra	zebra	zebra	cow	cow	cow	duck	duck	duck	goose		
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.