

A Review On Bidirectional Associative Memory

For Short-term Memory Learning

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Bidirectional Associative Memory (BAM) is a recurrent hetero-associative pattern matching network that accepts both binary and bipolar pattern. There were many issues in the standard BAM such as it required huge learning trials to find the appropriate associations, and another issue was it required larger memory storage capacity to perform efficiently.

Now, BAM was meant to work as our brain, as how our brain associates different object, but in case of rapid learning condition with limited memory standard BAM takes lot of time. Thus, concerned research paper has proposed a way to tackle this problem by implementing a recency parameter β which modifies the BAM to act as a short-term memory.

Following are the critical point for the concerned paper:

Pros:

- By adding the **recency parameter(β)**, learning time is reduced.
- As **recency term** act as forgetting parameter for previous weights, it eventually zero out the parameters that are not reinforced enough. Thus, resetting the parameter, after some learning loops, thus preventing the memory overload.
- By using transmission function as **classic Verhulst equation** extended to a cubic form with a saturating limit at ± 1 , there is assurance that it can work for both polar and bi-polar patterns
- Using **separate matrices** for each layer (W, V) ensure that it can work for both bi-polar and real values pattern
- Now, for rapid data our brain works somewhat in similar fashion by associating things which have occurred recently, thus by setting the value of **recency parameter(β)** one can easily manipulate whether to implement long-term learning or a short-term memory learning, one can also control how rapidly we want to forget.

Cons:

- **It still doesn't address the problem of incorrect convergence in case of noise(error).**
- In case of short-term learning, the noise tolerance is further degraded as the weight is continuously modified having larger associative weights for recently encountered pattern and forgetting the previous data.
- For faster computation we are somewhat sacrificing some association information which may lead to lower accuracy in some cases.
- No proper relation of β and number of patterns that can be kept in memory is given.

Conclusion:

For rapid learning, proposed method may prove to be one of the best so far, but again as every method have its own limitations, it has also some limitations as mentioned in the **cons** section, no method is full proof, So it depend on ones requirement whether to use it or not. Again, finding the correct combination of β for required no. of pattern to be kept at a time in memory can be a challenging task.