## **The 1D convolution operation**

What does the convolution operation do?

1. Let’s approach this with a real world example
2. Consider a flight from Chennai to Delhi
   1. We measure the distance of the flight from Chennai at regular intervals,
   2. In general, to calculate the overall speed, we would take the average speed at these measured points i.e .
   3. However, let us try giving the most importance to the current reading, and a progressively decreasing level of importance to every reading preceding the current one.
   4. Let’s assign different weights to each of these reading points
      1. (0 indicates current reference point)
      2. (1 reading before reference point)
      3. (1 readings before reference point)
   5. So the new overall speed would be calculated by where the weights are decreasing from w0
3. The formula could be written as follows
   1. Where t refers to reference point
   2. a is the index of the weight, ranging from 0 for reference point to
4. In practice, we wouldn’t want to take the reading up till , thus we can simply say that those unwanted weights are all 0.
5. Consider the following table

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | w-6 | w-5 | w-4 | w-3 | w-2 | w-1 | w0 |  |  |  |  |  |
| **W** | 0.01 | 0.01 | 0.02 | 0.02 | 0.04 | 0.04 | 0.05 |  |  |  |  |  |
| **X** | 1.00 | 1.10 | 1.20 | 1.40 | 1.70 | 1.80 | 1.90 | 2.10 | 2.20 | 2.40 | 2.50 | 2.70 |
| **S** |  |  |  |  |  |  | 1.80 |  |  |  |  |  |

1. In the above table, w-7 to w-∞ are all consider to be 0
2. Here,