Deterministic approach to Gibbs Sampling to find DNA Sequence Motifs

- **Goal**: Find regulatory motifs in DNA by looking at the most commonly repeated kmer (with mismatches) in DNA sequences
- **Method**: Gibbs Sampling with incorporation of a deterministic selection once the sample begins to converge
  - Deterministic = min(HammingDistance(Consensus,k-mer))
  - Selection of motif = random(Deterministic, Gibbs)
    - Probability of Gibbs = (tan-1(Score_Slope))/90
    - Probability of Deterministic = 1 - Gibbs
    - Score_Slope = Is the average slope of the graph of the score at each iteration. Can be calculated via exponentially weighted moving average
- **Expected results:** The deterministic approach should give a faster and more accurate convergence
- **Testing:**Test both my method and plain Gibbs sampling method on DNA strands with motif to quantify both performance and accuracy
- **Related Work:**Gert Thijs, Kathleen Marchal, Magali Lescot, Stephane Rombauts, Bart De Moor, Pierre Rouzé, and Yves Moreau. Journal of Computational Biology. July 2004, 9(2): 447-464. doi:10.1089/10665270252935566.