

- Neural Turing machines utilise external memory
 - The RNN reads and writes to multiple memory positions and uses an attention distribution to determine the extent to which it manipulates each position
 - The attention distribution is determined using the combination of their similarity to a query vector, the attention distribution of the previous step, and a shift filter allowing its attention to move relatively
 - This allows them to learn storing long sequences in memory and looping over it and mimic a lookup table or number sorter
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- Attentional Interfaces learns to evaluate sets of information to determine which parts are most relevant and focusing on them.
 - These can take the output from a neural network and return an input of the most relevant data for the network to look out for.
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- Adaptive Computation Time allows for each recurrence of the RNN to perform a different number of computations.
 - This allows you to find a balance between the performance of the neural network and the computation time.
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- Neural Programmers learns to create programs to solve tasks it can't solve itself, like arithmetic.
 - The programs are generated one operation at a time and act upon the outputs of previous operations
 - The neural net runs multiple possible operations at once and averages them weighted by the probability that we ran that operation
 - Then we can define a loss function that adjusts these probabilities and trains the neural net to create programs.