1. Recurrent - happening again many times
2. directed graph - A directed graph is graph, i.e., a set of objects (called vertices or nodes) that are connected together, where all the edges are directed from one vertex to another
3. Sequence - a series of related things or events, or the order in which they follow each other
4. exhibit - to show something publicly
5. variable - a number, amount, or situation that can change
6. applicable - affecting or relating to someone or something
7. indiscriminately - in a way that does not show careful choice or planning, usually with harmful results
8. broad - very wide
9. finite - having a limit or end
10. temporal dynamic behavior - the trajectory of states, in a state space, followed by a system during a certain time interval
11. a directed acyclic graph - a graph that is directed and without cycles connecting the other edges
12. unroll - to open and become flat from a rolled position
13. strictly - exactly or correctly
14. additional - put with something else to increase the number or amount or to make it more important
15. replace - to take the place of something
16. incorporate - to include something as part of something larger
17. delay - to make something happen at a later time than originally planned or expected
18. feedback - information or statements of opinion about something that can tell you if it is successful or liked
19. refer - to send someone or something to a different place or person for help
20. gated - having gates to control the movement of traffic, people, or animals.
21. unfold - to open or spread out something that has been folded
22. layer - a level of material that is different from the material above or below it
23. decompose - to break, or to break something, into smaller parts
24. synapse - he point at which electrical signals move from one nerve cell to another
25. timescale - the period of time that is needed to do an activity or process
26. yielding - giving a product or generating a financial return of a specified amount
27. supervise - to watch a person or activity to make certain that everything is done correctly
28. discrete - clearly separate or different in shape or form
29. spatial - relating to the position, area, and size of things
30. arrive - to reach a place, especially at the end of a journey
31. nonlinear - used to describe a process in which one thing does not clearly or directly follow from another
32. weighted - prepared and arranged in a way that is likely to produce a particular effect rather than any other
33. supply - to provide something that is wanted or needed
34. corresponding - similar to, connected with, or caused by something else
35. reinforcement learning - an area of machine learning
36. Instead - in place of someone or something else
37. occasionally - sometimes but not often
38. evaluate - to judge or calculate the quality, importance, amount, or value of something
39. influence - the power to have an effect on people or things, or a person or thing that is able to do this
40. affect - to cause a change in someone or something
41. deviation - the action of doing something that is different from the usual or common way of behaving
42. target - an object shot at during shooting practice
43. activation - the act of making something start or making it start working
44. numerous - many
45. arranged - to put a group of objects in a particular order
46. hidden - not easy to find
47. forward - towards the direction that is in front of you
48. fixed - arranged or decided already and not able to be changed
49. previous - happening or existing before something or someone else
50. propagate - to spread opinions, lies, or beliefs among a lot of people
51. thus - in this way
52. maintain - to continue to have; to keep in existence
53. allow - to give permission for someone to do something
54. prediction - a statement about what you think will happen in the future
55. beyond - further away in the distance (than something)
56. multilayer - relating to or consisting of several or many layers
57. perception - a belief or opinion, often held by many people and based on how things seem
58. vanishing - beginning to disappear
59. explode - to break up into pieces violently, or to cause something to do this
60. extend - to add to something in order to make it bigger or longer
61. avoid - to stay away from someone or something
62. explode - to break up into pieces violently, or to cause something to do this
63. interact - act in such a way as to have an effect on each other
64. robustly - in a determined way
65. saturated - completely wet
66. fuzzy - not clear
67. skip - to move lightly and quickly, making a small jump after each step
68. recursively - in a manner that can repeat itself indefinitely
69. differentiable - capable of being differentiated
70. traverse - to move or travel through an area
71. topological - relating to topology
72. reverse - to change the direction, order, position, result, etc. of something to its opposite
73. distribute - to give something out to several people, or to spread or supply something
74. representation - a person or organization that speaks, acts, or is present officially for someone else
75. correspond - to match or be similar or equal
76. evaluate - to judge or calculate the quality, importance, amount, or value of something
77. particular - special, or this and not any other
78. accord - to treat someone specially, usually by showing respect
79. against - disagreeing with a plan or activity
80. arbitrary - based on chance rather than being planned or based on reason
81. initially - at the beginning
82. encode - to change something into a system for sending messages secretly
83. predefined - decided, set, or arranged before something is done
84. manner - the way in which something is done
85. assign - to give a particular job or piece of work to someone
86. respective - relating or belonging to each of the separate people or things you have just mentioned
87. selection - the act of choosing someone or something
88. evolved - having developed through a gradual process
89. criterion - a standard by which you judge, decide about, or deal with something
90. satisfied - pleased because you have got what you wanted
91. percentage - an amount of something, often expressed as a number out of 100
92. generation - all the people of about the same age within a society or within a particular family
93. reciprocal - operating for both, esp. equally or to a similar degree
94. evolutionary - relating to the way in which living things develop over millions of years
95. seek - to try to find or get something, especially something that is not a physical object
96. simulated - made to look like or have the features of something else
97. annealing - to make metal or glass soft by heating and then cooling it slowly
98. particle - a word or a part of a word that has a grammatical purpose but often has little or no meaning
99. swarm - to move in a large group
100. optimization - the act of making something as good as possible

Summary

A recurrent neural network (RNN) is a class of artificial neural networks where connections between nodes form a directed graph along a temporal sequence. RNNs can use their internal state to process variable length sequences of inputs.

RNNs come in many variants. Basic RNNs are a network of neuron-like nodes organized into successive layers. An Elman network is a three-layer network with the addition of a set of context units. Jordan networks are similar to Elman networks. The Independently recurrent neural network (IndRNN) addresses the gradient vanishing and exploding problems in the traditional fully connected RNN. A recursive neural network is created by applying the same set of weights [recursively](https://en.wikipedia.org/wiki/Recursion) over a differentiable graph-like structure by traversing the structure in topological order. Such networks are typically also trained by the reverse mode of automatic differentiation. Hierarchical RNNs connect their neurons in various ways to decompose hierarchical behavior into useful subprograms. Recurrent Multi-Layer Perceptron (RMLP) network consists of cascaded subnetworks.

Training the weights in a neural network can be modeled as a non-linear global optimization problem. Arbitrary global optimization techniques may then be used to minimize a target function. The most common global optimization method for training RNNs is [genetic algorithms](https://en.wikipedia.org/wiki/Genetic_algorithm)

1. What does RNN mean?
2. How many layers does an Elman network has?
3. What does a Recurrent Multi-Layer Perceptron network consist of?
4. Who describes a system of cortical computing with memristive nanodevices?
5. How can training the weights in a neural network be modeled?
6. Why is the goal of the genetic algorithm to maximize the fitness function?
7. Where is the cross-neuron information explored?
8. What can recursive neural networks do?
9. Why do memristive networks have a limited memory capacity?
10. What is the most common global optimization method for training RNNs?