WHAT IS CLAIMED IS:

1. A storage device, comprising:

a nonvolatile memory device comprising a plurality of memory blocks, wherein each memory block comprises a plurality of memory cells connected to a plurality of word lines; and

a controller configured to perform a first read operation on memory cells connected to a selected word line included in a selected memory block based on a request of an external host device,

wherein the controller is further configured to perform a check read operation that checks a reliability of the memory cells of the selected memory block after performing the first read operation,

wherein, in the check read operation, the controller is further configured to select and perform one of an actual check and a machine learning-based check,

wherein, when the machine learning-based check is selected, the controller is configured to perform a sample read operation on memory cells connected to a check target word line in the selected memory block, and to determine an expected number of errors based on machine learning by using a result of the sample read operation and information of the storage device.

2. The storage device of claim 1, wherein, when the actual check is selected, the controller performs a second read operation on the memory cells connected to ~~a~~ the check target word line in the selected memory block, and counts an actual number of errors by performing error correction decoding on a result of the second read operation.

~~3. The storage device of claim 1, wherein, when the machine learning-based~~

~~check is selected, the controller is configured to perform a sample read operation on memory cells connected to a check target word line in the selected memory block, and to determine an expected number of errors based on machine learning by using a result of the sample read operation and information of the storage device.~~

~~4~~3. The storage device of claim ~~3~~1, wherein the information of the storage device comprises at least one of a location of the nonvolatile memory device on a wafer, an address of the selected memory block, a number of times that an erase operation is performed on the selected memory block, an address of the check target word line, a time that elapses after the memory cells connected to the check target word line are programmed, a number of read operations previously performed on the selected memory block, a duration that the selected memory block is left alone in an erase state before the selected memory block is programmed, a current temperature, and a current humidity.

~~5~~4. The storage device of any one of claims 1 to ~~4~~3, wherein the machine learning-based check uses a model which is generated based on at least one of a neural network, a decision tree, a support vector machine, and a linear regression model.

~~6~~5. The storage device of any one of claims 1 to ~~5~~4, wherein the word lines of the selected memory block are divided into a plurality of zones, and each zone comprises two or more word lines,

wherein, when the machine learning-based check is selected, the controller determines an expected number of errors of the two or more word lines in a check target zone in common.

~~7~~6. The storage device of claim 1, wherein, when the machine learning-based check is selected, the controller determines ~~an~~ the expected number of errors of the memory cells connected to ~~a~~ the check target word line in the selected memory block based on machine learning,

wherein, when the expected number of errors is equal to at least a first threshold value, the controller is configured to further determine an actual number of errors by performing the actual check on the check target word line.

~~8~~7. The storage device of claim ~~7~~6, wherein, when the actual number of ~~actual~~ errors detected through the actual check is equal to at least a second threshold value, the controller further performs a refresh operation on the selected memory block.

~~9~~8. The storage device of claim ~~7~~ 6 or claim ~~8~~7, wherein the controller adjusts the first threshold value based on a difference between the actual number of errors detected in the actual check and the expected number of errors determined in the machine learning-based check.

~~10~~9. The storage device of ~~any one of~~ claim~~s~~ 1 ~~to 9~~, wherein the controller is further configured to:

generate a plurality of random numbers respectively corresponding to the memory blocks;

count a number of read operations performed on each of the memory blocks; and

perform the check read operation on the selected memory block when the number of read operations of the selected memory block reaches a random number corresponding to the selected memory block.

~~11~~10. The storage device of claim ~~10~~9, wherein, when the check read operation is performed, the controller resets the number of read operations of the selected memory block and regenerates the random number corresponding to the selected memory block.

~~12~~11. The storage device of claim ~~10~~ 9 or claim ~~11~~10, wherein the controller counts ~~the~~ a number of check read operations performed on the selected memory block, selects the machine learning-based check when the number of check read operations is smaller than a threshold value, and select the actual check when the number of check read operations reaches the threshold value.

~~13~~12. The storage device of claim ~~12~~11, wherein, when the actual check is selected with regard to the selected memory block, the controller resets the number of check read operations of the selected memory block.

~~14~~13. The storage device of claim ~~12~~ 11 or claim ~~13~~12, wherein the controller adjusts the threshold value based on a difference between an actual number of ~~actual~~ errors detected in the actual check and ~~a~~ the expected number of ~~expected~~ errors determined in the machine learning-based check.

~~15~~14. A storage device, comprising:

a nonvolatile memory device comprising a plurality of memory blocks, wherein each memory block comprises a plurality of memory cells connected to a plurality of word lines; and

a controller configured to perform a read operation on memory cells connected to a

selected word line included in a selected memory block based on a request of an external host device,

wherein the controller is further configured to perform a check read operation that checks a reliability of the memory cells of the selected memory block after performing the read operation,

wherein, in the check read operation, the controller performs an actual check on first check target word lines in the selected memory block and performs a machine learning-based check on second check target word lines in the selected memory block,

wherein the controller is further configured to perform a sample read operation on memory cells connected to the second check target word lines in the selected memory block, and to determine an expected number of errors based on machine learning by using a result of the sample read operation and information of the storage device.

~~16~~15. The storage device of claim ~~15~~14, wherein, when ~~a~~ the expected number of ~~expected~~ errors with regard to one of the second check target word lines is equal to at least a threshold value, the controller is configured to further perform the actual check on the one of the second check target word lines.

~~17~~16. The storage device of claim ~~16~~15, wherein the controller is further configured to adjust a number of the first check target word lines and a number of the second check target word lines based on the expected number of ~~expected~~ errors from the one of the second check target word lines and an actual number of ~~actual~~ errors detected from the one of the second check target word lines through the actual check.

~~18~~17. An operating method of a storage device, comprising:

selecting a word line of a memory block from a plurality of memory blocks included in a nonvolatile memory device;

performing, at a controller configured to control the nonvolatile memory device, a read operation on a plurality of memory cells connected to the selected word line; and

performing, at the controller, a check read operation on memory cells connected to at least one check target word line of the memory block connected to the selected word line in response to the read operation,

wherein the check read operation combines an actual check and a machine learning-based check on the memory cells connected to the at least one check target word line,

the method further comprises:

in the check read operation, selecting and performing, at the controller, one of the actual check and the machine learning-based check; and

when the machine learning-based check is selected, performing, at the controller, a sample read operation on memory cells connected to the at least one check target word line in the selected memory block, and determining an expected number of errors based on machine learning by using a result of the sample read operation and information of the storage device.

~~19~~18. The method of claim ~~18~~17, wherein the check read operation comprises:

performing the machine learning-based check on the memory cells connected to the at least one check target word line; and

performing the actual check on the memory cells connected to the at least one check target word line when ~~a~~ the expected number of ~~expected~~ errors in the machine learning-based check is equal to at least a threshold value.

~~20~~19. The method of claim ~~18~~ 17 or claim ~~19~~18, wherein the at least one check target word line comprises a first check target word line and a second check target word line, wherein the check read operation comprises:

performing the actual check on the first check target word line; and

performing the machine learning-based check on the second check target word line.