Appendix 1 Identification criteria for biological test results of molecular markers

Definition criteria of ER and PR positivity: tumor cells without nuclear brownish yellow staining or less than 1% nuclear weak brownish yellow staining were defined as negative, whereas more than or equal to 1% nuclear brownish yellow staining was positive (49).

HER2 positive definition criteria: the level was divided into 0, 1 +, 2 +, and 3 +; 3 + was positive; 0 and 1 + were defined as negative. HER2 + was detected by fluorescence in situ hybridization (FISH), and a HER2/CEN17 of greater than or equal to 2 was deemed positive (50).

Ki67 index was defined as the estimated percentage of nuclear positive cells. The cutoff value was 20%, more than 20% was deemed high expression, and less than or equal to 20% was low expression.

References

49. Hammond ME, Hayes DF, Dowsett M, Allred DC, Hagerty KL, Badve S, et al. American Society of Clinical Oncology/College Of American Pathologists guideline recommendations for immunohistochemical testing of estrogen and progesterone receptors in breast cancer. J Clin Oncol 2010; 28:2784-95.
50. Wolff AC, Hammond MEH, Allison KH, Harvey BE, Mangu PB, Bartlett JMS, Bilous M, Ellis IO, Fitzgibbons P, Hanna W, Jenkins RB, Press MF, Spears PA, Vance GH, Viale G, McShane LM, Dowsett M. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology/College of American Pathologists Clinical Practice Guideline Focused Update. J Clin Oncol 2018;10:2105-22.
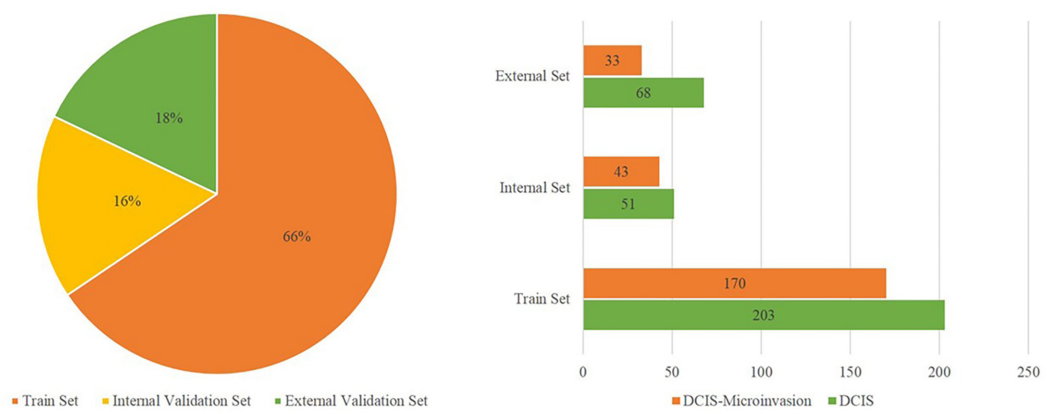
Figure S1 Data distribution of each subset. DCIS, ductal carcinoma in situ.

Table S1 Architecture of the employed network based on Inception-v3

Phrases	Convolutional layer, Kernel size/stride
Feature extraction	3×3/2
	3×3/1
	3×3/1
	Pool 3×3/2
	1×1/1
	3×3/1
	Pool 3×3/2

$$\begin{bmatrix} 1\times1/1, & 1\times1/1, & \text{Pool}3\times3/1, & 1\times1/1 \\ 3\times3/1, & 5\times5/1, & 1\times1/1, & \\ 3\times3/1, & & & \\ & \textit{Concatenation} & & \end{bmatrix} \times 3$$

$$\begin{bmatrix} 1\times1/1, & 3\times3/2, & \text{Pool}3\times3/2, \\ 3\times3/1, & & \\ 3\times3/2, & & \\ & \textit{Concatenation} & \end{bmatrix}$$

$$\begin{bmatrix} 1\times1/1, & 1\times1/1, & \text{Pool}3\times3/1, & 1\times1/1 \\ 1\times7/1, & 1\times7/1, & 1\times1/1, & \\ 7\times1/1, & 7\times1/1, & & \\ 1\times7/1, & & & \\ 7\times1/1, & & & \\ & \textit{Concatenation} & & \end{bmatrix} \times 4$$

$$\begin{bmatrix} 1\times1/1, & 1\times1/1, & \text{Pool}3\times3/2, \\ 1\times7/1, & 3\times3/2, & \\ 7\times1/1, & & \\ 3\times3/2, & & \\ & \textit{Concatenation} & \end{bmatrix}$$

$$\begin{bmatrix} 1\times1/1, & 1\times1/1, & \text{Pool}3\times3/1, & 1\times1/1 \\ 3\times3/1, & 1\times3/1\ 3\times3/1, & 1\times1/1, & \\ 1\times3/1\ 3\times3/1, & & & \\ & \textit{Concatenation} & & \end{bmatrix} \times 2$$