

Supplementary Methods

Nomogram construction

As the purpose of our study is to develop a method to predict cancer survival and provide guidance to cancer therapy, we firstly included nine patients-related and tumor-related characteristics (year of diagnosis, menopause status, tumour size, lymphnode involvement, metastasis-free interval, number of metastasis, metastasis site, hormone receptor status and human epidermal growth factor receptor 2 receptor status). Next, interactions effects between each variable were calculated by interaction terms. The survival correlation of variables was firstly assessed by univariable analysis with Cox regression. Variables which were significantly correlated with patient survival ($p < 0.05$) were next enrolled into multivariable Cox regression model, adjusting with interaction terms of each variable. We then excluded variables one by one based on the pvalue ($p > 0.05$). Variance inflation factor (VIF) was used to assess the collinearity ($0 < VIF < 10$, no collinearity; $10 \leq VIF < 100$, collinearity; $VIF \geq 100$, intensive collinearity). We performed the proportional hazards test to verify the proportional hazards assumption for the cox regression model ($p > 0.1$ is considered as variables are accordance with the Proportional Hazards Assumption). The results of VIF and the proportional hazards test are listed in S3 and S4 Tables.