

Hosni, M., Abnane, I., Idri, A., Carrillo-de-Gea, J. M. & Fernández-Alemán, J. L. (2019). Reviewing ensemble classification methods in breast cancer. *Computer Methods and Programs in Biomedicine*, 177, 89-112.

## Selected papers

Mapping Questions addressed by the selected studies. (MQ7 has 3 sub-questions: D: dataset, V: validation method, M: metrics)

Ref.	MQ1	MQ2	MQ3	MQ4	MQ5	MQ6	MQ7			MQ8	MQ9
							D	V	M		
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[185]	1	1	1	1	1	1	1	1	1	1	1
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[187]	1	1	1	1	1	1	1	1	1	0	0
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[189]	1	1	1	1	1	0	1	1	1	1	0
[190]	1	1	1	1	1	1	1	1	1	1	0
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[191]	1	1	1	1	1	0	1	1	1	0	0
[98]	1	1	1	1	1	0	1	1	1	0	0
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[194]	1	1	1	1	1	0	1	0	1	0	0
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[72]	1	1	1	1	1	1	1	1	1	1	0
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[77]	1	1	1	1	1	1	1	1	1	1	0
[197]	1	1	1	1	1	0	1	1	1	1	0
[198]	1	1	1	1	1	1	1	1	1	0	0
[199]	1	1	1	1	1	1	1	1	1	0	0
[78]	1	1	1	1	1	1	1	1	1	0	1
[116]	1	1	1	1	1	1	1	1	1	1	1
[200]	1	1	1	1	1	1	1	1	1	0	1
[65]	1	1	1	1	1	1	1	1	1	0	0
[92]	1	1	1	1	1	1	1	1	1	1	0
[76]	1	1	1	1	1	1	1	1	1	0	1
[201]	1	1	1	1	1	0	1	1	1	0	0
[202]	1	1	1	1	1	0	1	1	1	1	1
[203]	1	1	1	1	1	1	1	1	1	0	0
[81]	1	1	1	1	1	1	1	1	1	0	0
[79]	1	1	1	1	1	1	1	1	1	0	1
[204]	1	1	1	1	1	1	1	1	1	0	0
[205]	1	1	1	1	1	1	1	1	1	1	0
[34]	1	1	1	1	1	1	1	1	1	1	0
[55]	1	1	1	1	1	1	1	1	1	1	0
[206]	1	1	1	1	1	0	1	1	1	0	0
[207]	1	1	1	1	1	0	1	1	1	1	0
[88]	1	1	1	1	1	1	1	1	1	0	0
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[208]	1	1	1	1	1	1	1	1	1	0	0
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[209]	1	1	1	1	1	0	1	1	1	1	1
[210]	1	1	1	1	1	0	1	1	1	0	1
[211]	1	1	1	1	1	1	1	1	1	0	1
[49]	1	1	1	1	1	1	1	0	1	1	0
[212]	1	1	1	1	1	1	1	1	1	1	1
[213]	1	1	1	1	1	1	1	1	1	0	0
[214]	1	1	1	1	1	0	1	0	1	1	0
[105]	1	1	1	1	1	1	1	1	1	1	0
[215]	1	1	1	1	1	0	1	1	1	0	1
[53]	1	1	1	1	1	0	1	1	1	1	0
[107]	1	1	1	1	1	1	1	1	1	1	0
[58]	1	1	1	1	1	0	1	1	1	1	0
[73]	1	1	1	1	1	0	1	1	1	1	1
[216]	1	1	1	1	1	1	1	1	1	0	1
[69]	1	1	1	1	1	1	1	1	1	1	1
[217]	1	1	1	1	1	1	1	1	1	1	1
[43]	1	1	1	1	1	0	1	0	1	0	0
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[219]	1	1	1	1	1	1	1	1	1	1	0
[220]	1	1	1	1	1	0	1	1	1	0	1
[108]	1	1	1	1	1	0	1	1	1	1	0
[221]	1	1	1	1	1	0	1	1	1	1	1
[110]	1	1	1	1	1	0	1	0	1	1	0
[222]	1	1	1	1	1	1	1	0	1	0	0
[223]	1	1	1	1	1	0	1	1	1	1	0
[109]	1	1	1	1	1	1	1	1	1	1	0
[70]	1	1	1	1	1	1	1	0	1	1	0
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[225]	1	1	1	1	1	1	1	1	1	1	1
[226]	1	1	1	1	1	0	1	1	1	1	0
[227]	1	1	1	1	1	1	1	1	1	1	0
[228]	1	1	1	1	1	1	1	1	1	1	0
[229]	1	1	1	1	1	0	1	1	1	1	1
[36]	1	1	1	1	1	1	1	1	1	1	0
[230]	1	1	1	1	1	1	1	0	1	0	0
[231]	1	1	1	1	1	1	1	1	1	1	1

[232]	1	1	1	1	1	1	1	1	1	1	1
[233]	1	1	1	1	1	0	1	1	1	1	0
[234]	1	1	1	1	1	1	1	0	1	1	0
[235]	1	1	1	1	1	1	1	1	1	0	1
[80]	1	1	1	1	1	1	1	1	1	0	1
[236]	1	1	1	1	1	0	1	1	1	0	1
[237]	1	1	1	1	1	1	1	1	1	0	1
[238]	1	1	1	1	1	1	1	1	1	0	0
[61]	1	1	1	1	1	1	1	1	1	1	1
[62]	1	1	1	1	1	1	1	1	1	1	0
[35]	1	1	1	1	1	0	1	1	1	1	1
[239]	1	1	1	1	1	0	1	0	1	0	1
[240]	1	1	1	1	1	0	1	0	1	0	0
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[46]	1	1	1	1	1	0	1	1	1	1	0
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[241]	1	1	1	1	1	0	1	1	1	1	0
<b>Total</b>	<b>193</b>	<b>193</b>	<b>193</b>	<b>193</b>	<b>193</b>	<b>103</b>	<b>193</b>	<b>156</b>	<b>193</b>	<b>97</b>	<b>64</b>

## Appendix B: Datasets

Datasets used to build and to evaluate the ensemble methods in the selected datasets. The name of datasets was extracted as it is in the papers.

<b>Dataset</b>	<b>#. S</b>	<b>Type of data</b>	<b>Ref</b>
Wisconsin breast cancer dataset	56	Extracted from mammogram	[114]
Wisconsin diagnostic breast cancer	31	Extracted from mammogram	[12]
DDSM	14	Mammogram images	[112]
Wisconsin prognostic breast cancer	11	Extracted from mammogram	[113]
breast cancer data	8	Extracted from mammogram	[88]
Breast cancer gene [24481]	7	Gene expressions	[241]
MIAS	7	Mammogram images	[66]
Thermograms (Singapore General Hospital)	7	Thermograms	[124]
Gene expression dataset	6	Gene expression	[54]
Mammographic Mass dataset	5	Mammographic images	[205]
SEER	5	Surveillance, Epidemiology, and End Results	[110]
Mammogram dataset – Chicago University	4	Mammogram images	[151]
Affymetrix Human Genome U133A	3	Gene expression	[152]
Gene expression data	3	Gene expression	[206]
INbreast	3	Mammogram images	[104]
Van't Veer (Microrray)	3	Gene expression	[95]
BI-RADS	2	Mammogram images	[204]
FNA cytology	2	Fine needle aspiration	[169]
KDD cup 2008 breast cancer	2	-	[76]
Mammogram images Nijmegen	2	Mammogram images	[239]
METABRIC	2	Gene expression	[128]
Wang data	2	Gene expression	[120]
Breast Cancer Digital Repository	1	Mammogram images	[147]
Breast cancer gene	1	Gene expression	[49]
Breast thermal images	1	Thermography images	[97]
Breast tissue	1	Electrical impedance tomography	[58]
Cancer Hospital of Fudan University and the First Affiliated Hospital of Anhui Traditional Chinese Medical Hospital	1	Breast ultrasound images	[234]
DCE-MRI	1	Magnetic resonance imaging	[155]
DDSM-BCRP	1	Mammogram images	[148]
DNA microarray TCGA level 3 breast cancer	1	Gene Expression	[202]
DUKE University Mammogram Database	1	Needle localization and excisional biopsy	[146]
General Hospital (AKH) Linz Austria	1	Tumor markers	[185]
Genome mutation call data	1	Gene Expression	[223]

Human protein amino acid sequences (breast/non-breast)	1	Human protein amino acid sequences	[159]
IntAct	1	Protein-protein interaction	[93]
Isfahan Sayed-o-Shohada cancer research center	1	History of Clinical	[242]
miR2Disease	1	MicroRNA	[142]
MRI CADx	1	Magnetic resonance imaging	[129]
Breast cancer tumors of node-negative patients	1	Clinical data and gene expression	[212]
LBL breast cancer cell collection	1	Clinical data and gene expression	[212]
National Inpatient Sample (NIS)	1	Clinical and nonclinical records	[221]
NCBI	1	Protein-protein interaction	[93]
Queens Medical Centre in Nottingham, UK	1	Gene Expression	[94]
REIS	1	Resonance-frequency electrical impedance spectroscopy	[81]
STRING	1	Protein-protein interaction	[93]
Tamoxifen	1	Data on treatment of breast cancer with a drug tamoxifen	[197]
Thomas Jefferson University Hospital and the Hospital of the University of Pennsylvania	1	Galactogram	[170]
Tokyo Metropolitan Cancer and Infectious Diseases Centre at Komagome Hospital, Osaka National Hospital and Tsukuba University Hospital	1	Clinical data	[180]
University Hospital Centre of Coimbra	1	Clinical data	[46]
Van de Vijver	1	Gene expression	[120]
Srinagarind hospital in Thailand	1	Treatment information	[135]
Medical University of Wrocław, Poland	1	Images of fine needle aspirates	[100]
BreaKHis	1	Microscopic images	[106]
Regional Hospital in Zielona Góra, Poland	1	Images of fine needle aspirates	[165]
Tertiary cancer referral centre in Sydney, Australia	1	Clinical data	[44]
Second Affiliated Hospital of Harbin Medical University, Harbin, China	1	Ultrasound images	[181]
Andhra Pradesh, India	1	Clinical data	[194]
Milad Hospital in Tehran	1	Magnetic resonance imaging	[201]
Cancer Registry Organization of Kerman Province, in Iran	1	Clinical data	[209]
Samsung and Hanyan University Medical Centers, Seoul, Korea	1	Clinical data	[53]
Portugal	1	Clinical data	[43]
First Hospital of Jilin University, China	1	Clinical data	[222]
Seoul National University Hospital, Korea	1	Clinical data	[225]
Radiological clinic, University of Bonn, Germany	1	Biomarkers	[36]
Egypt National Cancer Institute and Faculty of medicine in Cairo University	1	Biomarkers	[236]

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