Evaluation metrics

Here, we adopt twelve well-established metrics to assess the quality of predicted protein complexes, including sensitivity, positive predictive value, accuracy, and separation from (Brohée & van Helden, 2006), fraction match, and maximum matching ratio from (Nepusz, et al., 2012), precision, recall, and F-measure from (Liu, et al., 2009), and precision[+], recall[+], and F-measure[+] from (Maddi, et al., 2019). Given a set of predicted protein complexes P and a set of reference protein complexes C, a contingency table T is assembled with n rows denoting complexes in C, and m columns representing clusters in P. The entry $t_{i,j}$ indicates the number of shared proteins between complex i and cluster j. N_i denotes the number of proteins in complex i, $N = \sum_i N_i$, and P_j stands for the number of proteins in cluster j. For approaches that predict overlapping clusters, the marginal row, and column sums may not correspond to the size of reference and predicted complexes, respectively. The positive predictive value (PPV), sensitivity (SN), accuracy (ACC), and separation (SEP) are defined as:

$$PPV = \frac{\sum_j \max_i(t_{i,j})}{\sum_j \sum_i t_{i,j}}, \tag{1}$$

$$SN = \frac{\sum_i \max_j(t_{i,j})}{\sum_i t_{i,j}}, \tag{2}$$

$$ACC = \sqrt{PPV \times SN}, \tag{3}$$

$$SEP = \sqrt{\frac{1}{nm} \sum_i \sum_j \left(\frac{t_{i,j}}{t_{.j}} \times \frac{t_{i,j}}{t_{.i}}\right) \times \sum_j \sum_i \left(\frac{t_{i,j}}{t_{.j}} \times \frac{t_{i,j}}{t_{.i}}\right)}. \tag{4}$$

Accuracy considers both SN and PPV, and it shows the overall performance. Furthermore, separation is a product of the proportion of proteins of a reference complex that are found in a predicted complex and the proportion of proteins in a predicted complex that is in a reference complex, to quantify a relationship between predicted and reference complexes.

The fraction match (FRM) first calculates the overlap score between reference and predicted complex, i and j, in which the overlap score (OS) is given by

$$OS = \frac{t_{i,j}^2}{N_i P_j}. \tag{5}$$

Then we considered the fraction of predicted complexes whose OS is higher than 0.25, as suggested by (Nepusz, et al., 2012). The maximum matching ratio (MMR) is given by the value of the maximum matching per complex in a bipartite graph, with vertices corresponding to the reference and predicted complexes, as two partitions. In this graph, the edges are weighted by the overlap score between respective reference and predicted complexes.

To calculate precision and recall, we first determine if any of the predicted complexes match with any of the reference complexes. Following (Liu, et al., 2009; Habibi, et al., 2010; Srihari, et al., 2015), we employed Jaccard similarity (i.e. $Jaccard(P,C) = \frac{|P \cap C|}{|P \cup C|}$). Thereby, the predicted complex matches the reference complex if their Jaccard similarity is higher than 0.5. Hence, precision, recall, and F-measure are defined as:

$$Precision = \frac{|p_i \in P| \exists c_j \in C, p_i matches c_j|}{|P|}, \tag{6}$$

$$Recall = \frac{|c_i \in C| \exists p_j \in P, p_j matches c_i|}{|C|}, \tag{7}$$

$$F - measure = \frac{2 \times Precision \times Recall}{Precision + Recall}. \tag{8}$$

F-measure considers both precision and recall. Thereby, it illustrates the overall performance.

The precision[+] and recall[+] are given by $\frac{N_P^+}{|P|}$ and $\frac{N_C^+}{|C|}$, respectively. Whereby, N_P^+ and N_C^+ are defined as:

$$N_P^+ = |\{p_i \in P| \exists c_j \in C, OS(p_i, c_j) \geq \theta, (p_i, c_j) \in Match(P, C, \theta)\}|, \tag{9}$$

$$N_C^+ = |\{c_j \in C| \exists p_i \in P, OS(p_i, c_j) \geq \theta, (p_i, c_j) \in Match(P, C, \theta)\}|. \tag{10}$$

The OS computes the overlap score between reference and predicted complexes, while $Match(P, C, \theta)$ includes the edges in the induced maximum matching of the bipartite graph that has reference complexes on one side and the predicted complexes on the other side. The F-measure[+] is calculated the same way as the original F-measure, likewise, it shows the overall performance.

Supplementary Figure 1. Comparative analysis of approaches for prediction of protein complexes. The comparative analyses are conducted concerning a composite score combining four performance measures, maximum matching ratio (MMR), fraction match (FRM), accuracy (ACC), and F-measure. Seventeen approaches, ordered by the year of publication, are compared on (A – C) two PPI networks of *E. coli* regarding Ecocyc and Metabolic gold standards, respectively, (D – J) four PPI networks of *S. cerevisiae* regarding SGD and CYC2008 gold standard, and (K) STRING PPI network of *H. sapiens* regarding CORUM gold standard.

G

KroganExt-CYC

H

Collins-CYC2008

I

KroganCore-CYC2008

MMR FMR ACC F-measure

G KroganExt-CYC

H Collins-CYC2008

I KroganCore-CYC2008

Legend: MMR (green), FMR (pink), ACC (purple), F-measure (blue)

J

KroganExt-SGD

K

STRING-CORUM
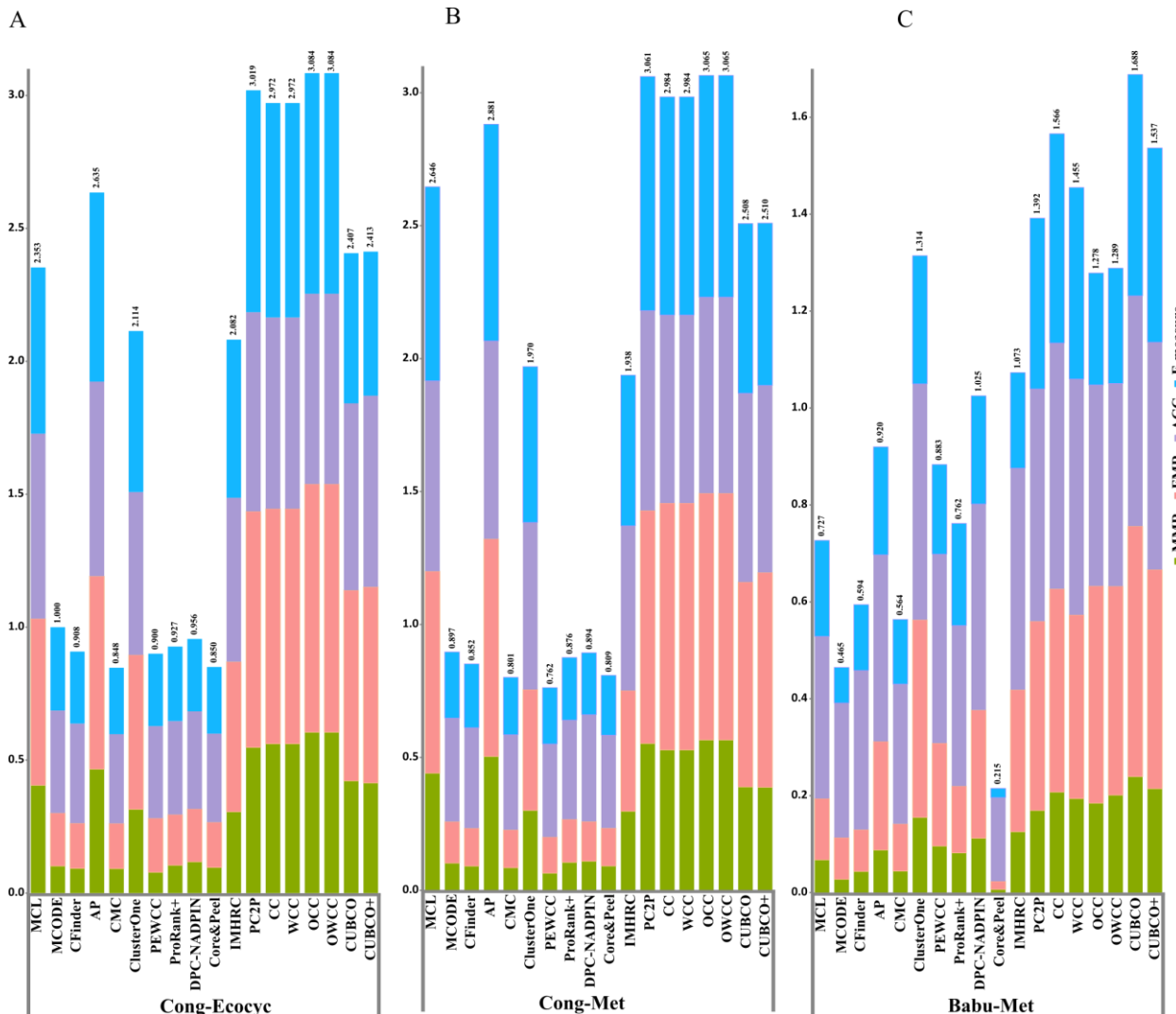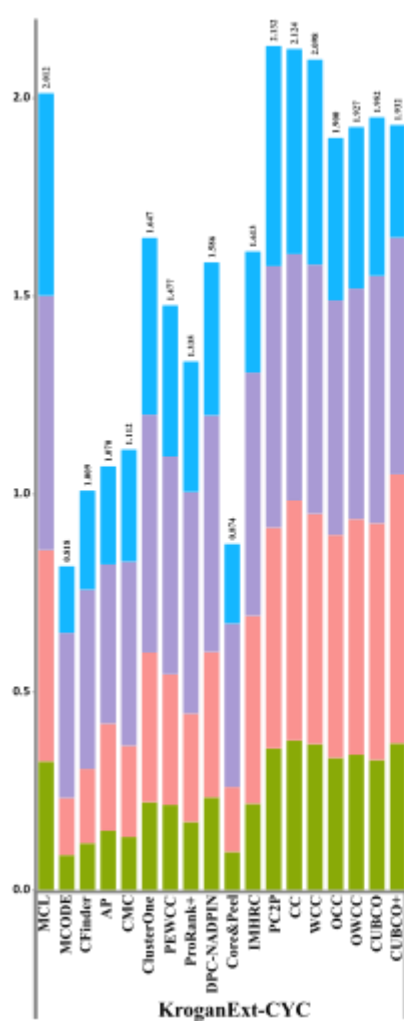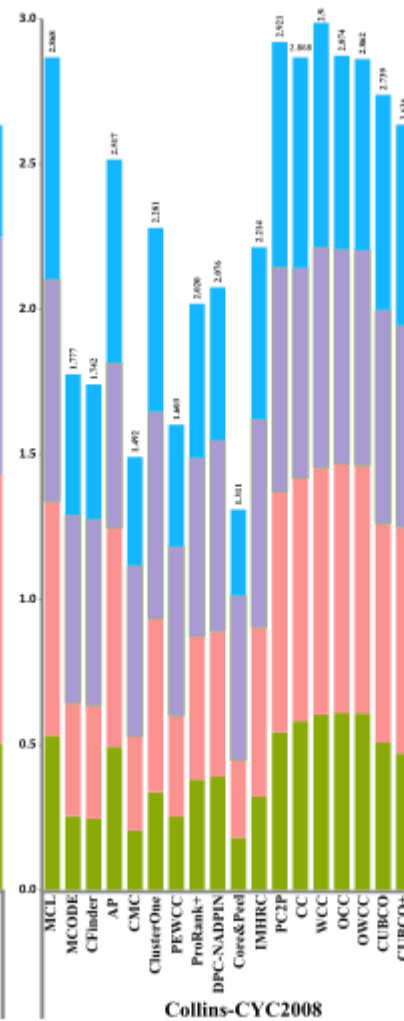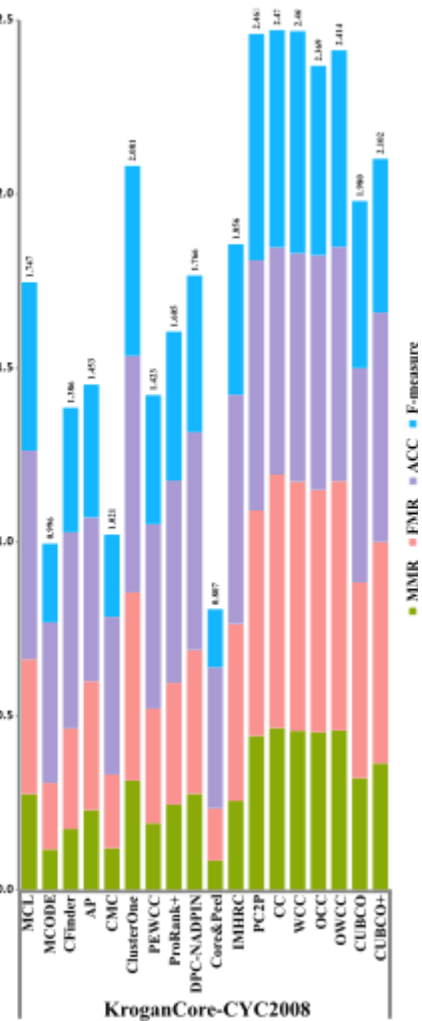
MMR · FMR · ACC · F-measure
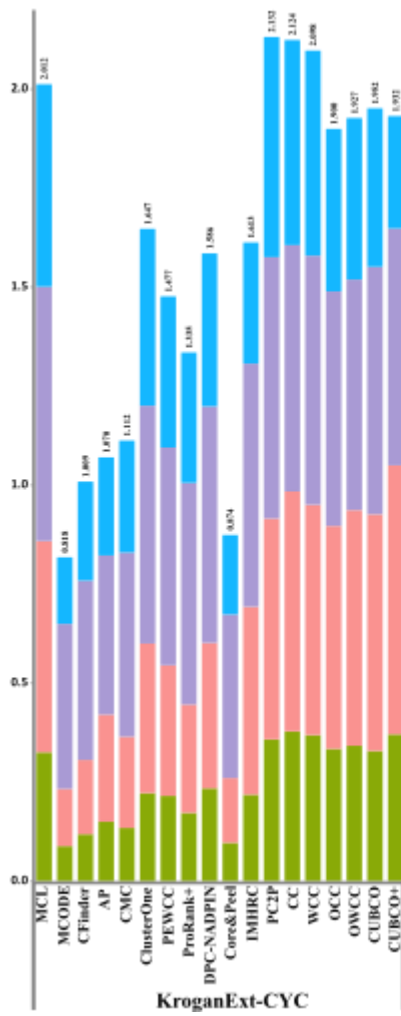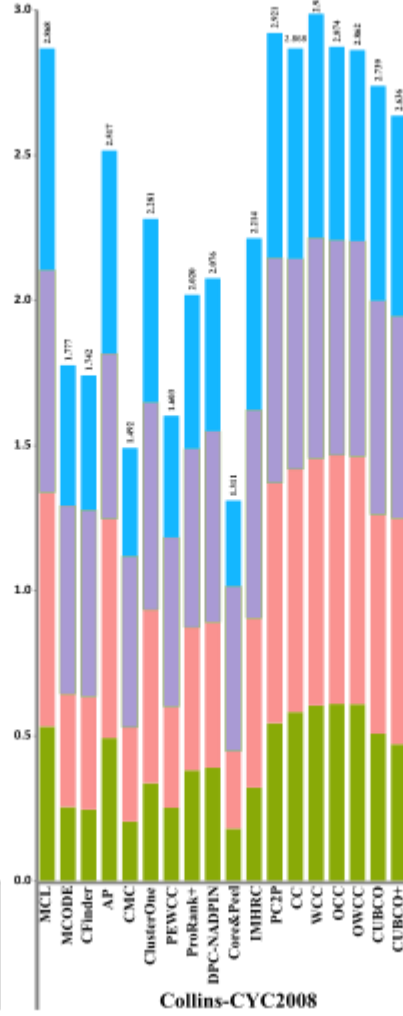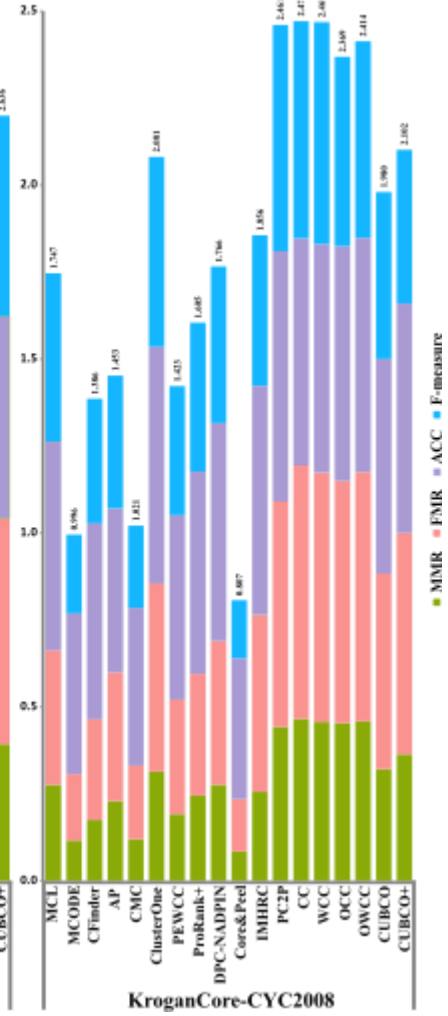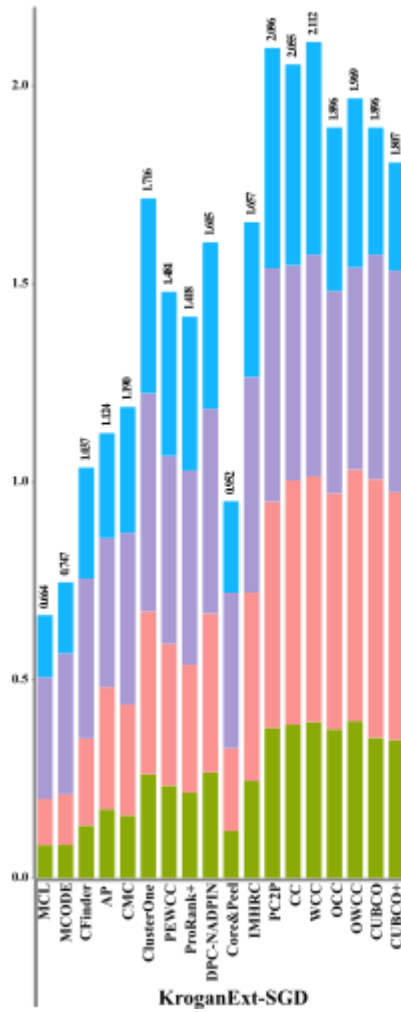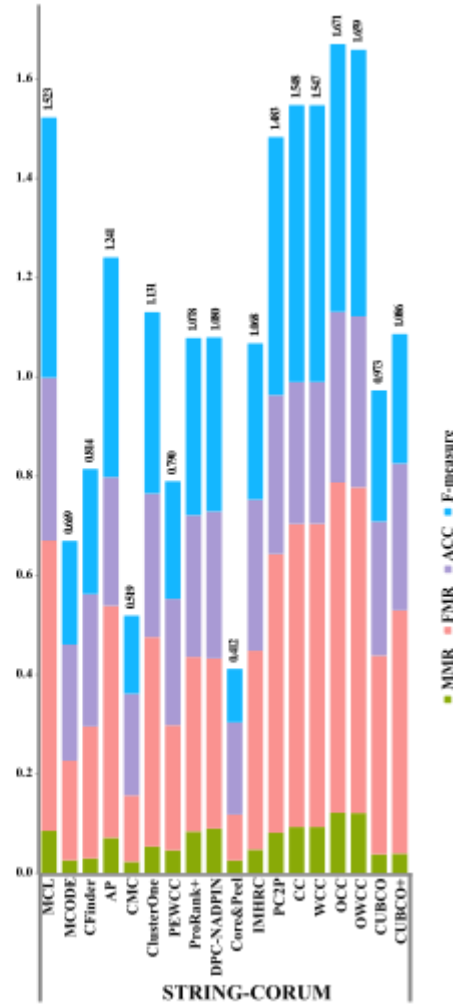
References

Brohée, S. & van Helden, J., 2006. Evaluation of clustering algorithms for protein-protein interaction networks. *BMC Bioinformatics,* 11.Volume 7.

Habibi, M., Eslahchi, C. & Wong, L., 2010. Protein complex prediction based on k-connected subgraphs in protein interaction network. *BMC Systems Biology,* Volume 4, p. 129.

Liu, G., Wong, L. & Chua, H. N., 2009. Complex discovery from weighted PPI networks. *Bioinformatics,* 5, Volume 25, p. 1891–1897.

Maddi, A. M. A., Moughari, F. A., Balouchi, M. M. & Eslahchi, C., 2019. CDAP: An Online Package for Evaluation of Complex Detection Methods. *Scientific Reports,* 9.Volume 9.

Nepusz, T., Yu, H. & Paccanaro, A., 2012. Detecting overlapping protein complexes in protein-protein interaction networks. *Nature Methods,* 3, Volume 9, p. 471–472.

Srihari, S., Yong, C. H., Patil, A. & Wong, L., 2015. Methods for protein complex prediction and their contributions towards understanding the organisation, function and dynamics of complexes. *FEBS Letters,* 4, Volume 589, p. 2590–2602.

SupplementaryTable 1. Shown are the properties, i.e. number of proteins and interactions, in the PPI networks used in our analysis. E stands for *E.Coli* , Y for yeast, H for human, P for Plants, and A for Animal. We also show the number of proteins and complexes in each of the gold standards used in our analysis. Finally, we also show the number of nodes and edges in the intersection of the PPI networks and gold standards of *E.coli* , yeast, human, plants, and Animal respectively.

PPI networks								
	Babu (E)	**Cong (E)**	**Collins (Y)**	**Gavin (Y)**	**KroganCore (Y)**	**KroganExt (Y)**	**STRING (H)**	**PIPS (H)**
#Proteins	2,045	1,476	1,622	1,855	2,708	3,672	2,227	1,673
#Interactions	12,801	1,618	9,074	7,669	7,123	14,317	8,565	5,385
weighted	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

Gold standards

	Ecocyc(E)	**Metabolite(**	**SGD(Y)**	**CYC2008(Y)**	**Corum(H)**
#proteins	749	475	1,279	1,627	4,479
#complexes	299	206	323	408	4,274
#complexes ≥ 3	181	118	238	236	2,783

Intersection of PPI networks and gold standards

SGD	**Collins(Y)**	**Gavin(Y)**	**KroganCore(Y)**	**KroganExt(Y)**
#Proteins	830	776	944	1,057
#interactions	2,955	2,639	2,554	3,688

CYC2008	**Collins(Y)**	**Gavin(Y)**	**KroganCore(Y)**	**KroganExt(Y)**
#Proteins	1,116	1,047	1,149	1,263
#interactions	6,392	4,031	3,169	4,714

Corum	**STRING(H)**	**PIPS(H)**
#Proteins	1,711	871
#interactions	7,289	2,692

Ecocyc	**Babu(E)**	**Cong(E)**
#Proteins	414	513
#interactions	1,718	480

Metabolic	**Babu(E)**	**Cong(E)**
#Proteins	289	315
#interactions	815	276

SupplementaryTable 2. Overview of the contending algorithms used in this study.

Method	Year	Weighted	Overlap	Website
MCL	2002	✓	✓	https://micans.org/mcl/
MCODE	2003	×	✓	http://www.rbvi.ucsf.edu/cytoscape/clusterMaker2/
CFinder	2006	✓	✓	http://cfinder.org/
AP	2007	×	×	http://www.rbvi.ucsf.edu/cytoscape/clusterMaker2/
CMC	2009	✓	✓	https://www.comp.nus.edu.sg/~wongls/projects/complexprediction/CMC-26may09/
ClusterOne	2012	✓	✓	http://www.rbvi.ucsf.edu/cytoscape/clusterMaker2/
PEWCC	2013	✓	×	https://faculty.uaeu.ac.ae/nzaki/Research.htm
ProrankPlus	2014	✓	✓	https://faculty.uaeu.ac.ae/nzaki/Research.htm
DPC-NADPIN	2016	×	✓	https://github.com/ccnuyili/DPC-NADPIN
Core&Peel	2016	✓	✓	http://bioalgo.iit.cnr.it/ppin/index.php?page=param&id=572664770&fn=DIP
IMHRC	2017	✓	✓	http://www.eslahchilab.ir/softwares/cdap
PC2P	2020	×	×	https://github.com/SaraOmranian/PC2P
GCC-v	2021	✓	✓	https://github.com/SaraOmranian/GCC-v
CUBCO	2022	✓	×	https://github.com/SaraOmranian/CUBCO

SupplementaryTable 3. Comparative analysis of eight algorithms for prediction of protein complexes with respect to twelve performance measures as well as two composite scores.

Comparative analysis
Yeast - CYC2008

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
Collins	MCL	184	0.533	0.805	0.731	0.615	0.956	0.767	0.908	0.659	0.763	0.875	0.549	0.675	1.208	2.868	4
	MCODE	93	0.255	0.389	0.528	0.665	0.633	0.649	0.892	0.331	0.483	0.849	0.270	0.409	0.665	1.777	14
	CFinder	89	0.247	0.389	0.493	0.532	0.775	0.642	0.888	0.314	0.464	0.843	0.256	0.393	0.640	1.742	15
	AP	194	0.493	0.754	0.578	0.454	0.716	0.570	0.799	0.621	0.699	0.753	0.498	0.600	1.092	2.517	9
	CMC	119	0.205	0.324	0.333	0.646	0.538	0.590	0.622	0.266	0.373	0.571	0.232	0.330	0.535	1.492	17
	ClusterOne	127	0.338	0.597	0.553	0.611	0.833	0.714	0.898	0.488	0.632	0.819	0.355	0.495	0.833	2.281	10
	PEWCC	226	0.253	0.348	0.250	0.517	0.657	0.583	0.730	0.294	0.419	0.336	0.259	0.293	0.546	1.603	16
	ProrankPlus	458	0.382	0.491	0.238	0.477	0.796	0.616	0.683	0.433	0.530	0.251	0.392	0.306	0.688	2.020	13
	DPC-NADPIN	522	0.391	0.502	0.215	0.538	0.804	0.658	0.648	0.444	0.527	0.218	0.389	0.280	0.670	2.076	12
	Core&Peel	210	0.181	0.266	0.198	0.647	0.499	0.568	0.457	0.218	0.296	0.276	0.198	0.231	0.412	1.311	18
	IMHRC	117	0.322	0.584	0.552	0.605	0.851	0.717	0.915	0.437	0.591	0.846	0.338	0.483	0.805	2.214	11
	PC2P	191	0.545	0.826	0.738	0.671	0.897	0.776	0.895	0.683	0.775	0.864	0.563	0.682	1.227	2.921	2
	CC	250	0.582	0.836	0.694	0.754	0.697	0.725	0.736	0.713	0.724	0.704	0.601	0.648	1.231	2.868	5
	WCC	241	0.605	0.850	0.722	0.759	0.762	0.761	0.797	0.747	0.771	0.755	0.621	0.682	1.287	2.987	1
	OCC	515	0.610	0.857	0.430	0.593	0.925	0.741	0.598	0.751	0.666	0.353	0.621	0.450	1.061	2.874	3
	OWCC	516	0.610	0.853	0.431	0.596	0.923	0.742	0.587	0.747	0.658	0.351	0.618	0.447	1.057	2.862	6
	CUBCO	185	0.508	0.754	0.719	0.659	0.823	0.736	0.881	0.638	0.740	0.822	0.519	0.636	1.144	2.739	7
	CUBCO+	182	0.472	0.778	0.664	0.655	0.740	0.696	0.736	0.650	0.690	0.637	0.451	0.528	1.000	2.636	8

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
Gavin	MCL	100	0.252	0.457	0.527	0.427	0.939	0.634	0.790	0.333	0.469	0.720	0.247	0.368	0.620	1.811	13
	MCODE	87	0.209	0.333	0.490	0.562	0.654	0.606	0.770	0.265	0.394	0.701	0.210	0.323	0.532	1.543	17
	CFinder	103	0.245	0.443	0.465	0.485	0.816	0.629	0.806	0.337	0.475	0.718	0.254	0.376	0.620	1.792	14
	AP	131	0.242	0.436	0.400	0.305	0.719	0.468	0.603	0.323	0.421	0.489	0.220	0.303	0.545	1.567	16
	CMC	138	0.239	0.399	0.394	0.649	0.568	0.607	0.717	0.337	0.458	0.522	0.247	0.336	0.575	1.703	15
	ClusterOne	140	0.301	0.564	0.494	0.574	0.801	0.678	0.757	0.426	0.545	0.621	0.299	0.404	0.705	2.088	10
	PEWCC	257	0.291	0.457	0.293	0.565	0.710	0.633	0.712	0.357	0.476	0.315	0.278	0.296	0.586	1.857	12
	ProrankPlus	395	0.363	0.553	0.265	0.523	0.808	0.650	0.770	0.457	0.574	0.273	0.371	0.315	0.678	2.140	9
	DPC-NADPIN	562	0.375	0.608	0.202	0.536	0.842	0.672	0.673	0.460	0.547	0.176	0.340	0.232	0.608	2.202	8
	Core&Peel	176	0.179	0.282	0.248	0.682	0.484	0.575	0.631	0.230	0.337	0.330	0.199	0.248	0.427	1.372	18
	IMHRC	123	0.267	0.553	0.491	0.537	0.843	0.673	0.691	0.357	0.471	0.593	0.251	0.353	0.620	1.964	11
	PC2P	154	0.367	0.632	0.598	0.614	0.831	0.714	0.792	0.491	0.607	0.695	0.368	0.481	0.848	2.320	6
	CC	215	0.429	0.718	0.589	0.679	0.681	0.680	0.688	0.591	0.636	0.595	0.440	0.506	0.935	2.463	2
	WCC	200	0.441	0.715	0.615	0.689	0.725	0.707	0.755	0.605	0.672	0.670	0.460	0.546	0.987	2.534	1
	OCC	463	0.434	0.677	0.306	0.567	0.869	0.702	0.540	0.526	0.533	0.268	0.426	0.329	0.763	2.346	5
	OWCC	463	0.462	0.749	0.313	0.557	0.881	0.701	0.521	0.557	0.538	0.268	0.426	0.329	0.791	2.450	3
	CUBCO	197	0.395	0.644	0.573	0.615	0.772	0.689	0.584	0.513	0.546	0.497	0.375	0.428	0.823	2.274	7
	CUBCO+	168	0.448	0.687	0.587	0.635	0.762	0.696	0.571	0.547	0.559	0.506	0.423	0.461	0.909	2.390	4

SupplementaryTable 3. Comparative analysis of eight algorithms for prediction of protein complexes with respect to twelve performance measures as well as two composite scores.

Comparative analysis

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
KroganCore	MCL	126	0.277	0.387	0.510	0.388	0.926	0.600	0.849	0.338	0.484	0.786	0.286	0.419	0.696	1.747	11
	MCODE	65	0.117	0.191	0.366	0.581	0.367	0.462	0.677	0.136	0.226	0.569	0.107	0.180	0.297	0.996	17
	CFinder	87	0.176	0.289	0.388	0.494	0.643	0.564	0.828	0.228	0.358	0.759	0.191	0.305	0.481	1.386	15
	AP	151	0.230	0.370	0.393	0.312	0.711	0.471	0.596	0.280	0.381	0.483	0.211	0.294	0.524	1.453	13
	CMC	102	0.121	0.211	0.267	0.659	0.312	0.454	0.549	0.150	0.236	0.412	0.121	0.188	0.308	1.021	16
	ClusterOne	189	0.315	0.540	0.470	0.619	0.748	0.680	0.762	0.425	0.546	0.556	0.303	0.393	0.708	2.081	7
	PEWCC	246	0.192	0.329	0.235	0.531	0.529	0.530	0.707	0.251	0.371	0.276	0.197	0.230	0.422	1.423	14
	ProrankPlus	340	0.246	0.350	0.206	0.512	0.661	0.582	0.741	0.301	0.428	0.262	0.257	0.259	0.505	1.605	12
	DPC-NADPIN	520	0.277	0.413	0.178	0.558	0.703	0.626	0.696	0.332	0.450	0.194	0.292	0.233	0.510	1.766	10
	Core&Peel	144	0.085	0.150	0.143	0.652	0.252	0.405	0.472	0.101	0.167	0.201	0.084	0.118	0.204	0.807	18
	IMHRC	155	0.257	0.509	0.460	0.548	0.791	0.658	0.690	0.315	0.433	0.542	0.243	0.335	0.592	1.856	9
	PC2P	214	0.443	0.647	0.638	0.675	0.766	0.719	0.785	0.555	0.650	0.724	0.448	0.554	0.997	2.461	3
	CC	279	0.466	0.728	0.611	0.732	0.582	0.653	0.649	0.601	0.624	0.573	0.462	0.512	0.978	2.471	1
	WCC	275	0.457	0.717	0.603	0.733	0.588	0.657	0.665	0.613	0.638	0.564	0.448	0.499	0.957	2.469	2
	OCC	479	0.454	0.697	0.321	0.542	0.839	0.674	0.537	0.552	0.544	0.324	0.448	0.376	0.830	2.369	5
	OWCC	475	0.459	0.717	0.326	0.535	0.847	0.673	0.549	0.581	0.565	0.328	0.451	0.380	0.839	2.414	4
	CUBCO	196	0.322	0.562	0.492	0.555	0.684	0.616	0.495	0.466	0.480	0.388	0.303	0.340	0.662	1.980	8
	CUBCO+	203	0.365	0.636	0.485	0.614	0.709	0.660	0.399	0.495	0.442	0.300	0.332	0.315	0.680	2.102	6

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
KroganExt	MCL	207	0.326	0.534	0.529	0.517	0.799	0.643	0.676	0.410	0.511	0.570	0.316	0.407	0.732	2.012	4
	MCODE	54	0.089	0.145	0.334	0.491	0.353	0.417	0.648	0.097	0.168	0.593	0.086	0.150	0.239	0.818	18
	CFinder	69	0.119	0.188	0.299	0.302	0.681	0.453	0.739	0.150	0.250	0.681	0.126	0.213	0.331	1.009	16
	AP	143	0.150	0.271	0.304	0.273	0.592	0.402	0.427	0.174	0.247	0.336	0.129	0.186	0.336	1.070	15
	CMC	125	0.135	0.231	0.280	0.616	0.351	0.465	0.624	0.182	0.282	0.440	0.147	0.221	0.355	1.112	14
	ClusterOne	144	0.222	0.378	0.419	0.610	0.591	0.600	0.792	0.311	0.447	0.646	0.249	0.360	0.582	1.647	9
	PEWCC	350	0.216	0.330	0.202	0.533	0.568	0.550	0.660	0.268	0.381	0.229	0.214	0.221	0.437	1.477	12
	ProrankPlus	206	0.173	0.273	0.239	0.570	0.550	0.560	0.680	0.217	0.329	0.330	0.182	0.235	0.408	1.335	13
	DPC-NADPIN	546	0.235	0.367	0.146	0.509	0.701	0.597	0.658	0.273	0.386	0.154	0.225	0.183	0.417	1.586	11
	Core&Peel	185	0.097	0.164	0.144	0.589	0.290	0.413	0.535	0.123	0.200	0.222	0.110	0.147	0.244	0.874	17
	IMHRC	182	0.219	0.475	0.367	0.470	0.802	0.614	0.489	0.223	0.306	0.363	0.177	0.238	0.457	1.613	10
	PC2P	231	0.358	0.558	0.572	0.632	0.690	0.660	0.675	0.472	0.556	0.563	0.349	0.430	0.789	2.132	1
	CC	286	0.378	0.606	0.561	0.688	0.563	0.622	0.573	0.472	0.518	0.465	0.357	0.404	0.782	2.124	2
	WCC	273	0.369	0.582	0.569	0.691	0.572	0.629	0.586	0.464	0.518	0.480	0.351	0.406	0.775	2.098	3
	OCC	545	0.334	0.563	0.201	0.427	0.822	0.592	0.413	0.408	0.410	0.209	0.306	0.248	0.583	1.900	8
	OWCC	521	0.342	0.595	0.206	0.411	0.826	0.582	0.386	0.432	0.407	0.223	0.311	0.260	0.602	1.927	7
	CUBCO	267	0.329	0.598	0.474	0.621	0.630	0.625	0.352	0.462	0.400	0.262	0.279	0.270	0.599	1.952	5
	CUBCO+	373	0.371	0.680	0.452	0.713	0.502	0.598	0.201	0.481	0.284	0.121	0.249	0.162	0.533	1.932	6

SupplementaryTable 3. Comparative analysis of eight algorithms for prediction of protein complexes with respect to twelve performance measures as well as two composite scores.

Comparative analysis

Yeast - SGD

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
Collins	MCL	151	0.526	0.814	0.691	0.564	0.871	0.701	0.881	0.667	0.759	0.848	0.540	0.660	1.186	2.800	3
	MCODE	85	0.276	0.456	0.515	0.543	0.634	0.587	0.800	0.350	0.487	0.800	0.287	0.422	0.698	1.806	15
	CFinder	83	0.285	0.485	0.515	0.489	0.757	0.609	0.855	0.354	0.501	0.843	0.295	0.438	0.723	1.880	14
	AP	152	0.491	0.730	0.531	0.453	0.689	0.558	0.822	0.599	0.693	0.776	0.498	0.607	1.098	2.473	9
	CMC	74	0.213	0.367	0.379	0.526	0.538	0.532	0.851	0.300	0.443	0.757	0.236	0.360	0.573	1.555	17
	ClusterOne	104	0.355	0.586	0.546	0.558	0.757	0.650	0.885	0.481	0.623	0.865	0.380	0.528	0.883	2.215	10
	PEWCC	137	0.268	0.405	0.298	0.448	0.629	0.531	0.810	0.316	0.455	0.467	0.270	0.342	0.611	1.659	16
	ProrankPlus	314	0.427	0.578	0.281	0.448	0.758	0.583	0.803	0.485	0.605	0.322	0.426	0.367	0.794	2.193	11
	DPC-NADPIN	318	0.424	0.582	0.266	0.427	0.783	0.578	0.777	0.460	0.578	0.318	0.426	0.364	0.788	2.162	13
	Core&Peel	106	0.190	0.321	0.248	0.497	0.504	0.501	0.736	0.253	0.377	0.472	0.211	0.292	0.482	1.388	18
	IMHRC	102	0.347	0.578	0.539	0.555	0.763	0.651	0.882	0.456	0.601	0.853	0.367	0.513	0.861	2.178	12
	PC2P	153	0.529	0.814	0.690	0.580	0.841	0.698	0.869	0.671	0.757	0.843	0.544	0.662	1.191	2.799	4
	CC	188	0.577	0.827	0.679	0.645	0.706	0.675	0.809	0.734	0.770	0.745	0.591	0.659	1.236	2.848	2
	WCC	186	0.585	0.844	0.687	0.649	0.745	0.695	0.823	0.743	0.781	0.758	0.595	0.667	1.251	2.904	1
	OCC	370	0.620	0.827	0.431	0.490	0.871	0.653	0.649	0.730	0.687	0.403	0.629	0.491	1.110	2.787	5
	OWCC	372	0.614	0.840	0.430	0.486	0.869	0.650	0.634	0.734	0.681	0.392	0.616	0.479	1.094	2.784	6
	CUBCO	155	0.484	0.755	0.661	0.571	0.754	0.656	0.787	0.603	0.683	0.735	0.481	0.582	1.066	2.579	7
	CUBCO+	151	0.465	0.766	0.617	0.584	0.661	0.622	0.775	0.636	0.698	0.629	0.444	0.521	0.985	2.551	8

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
Gavin	MCL	78	0.240	0.433	0.499	0.347	0.920	0.565	0.821	0.317	0.457	0.756	0.246	0.371	0.611	1.696	14
	MCODE	77	0.230	0.413	0.474	0.507	0.650	0.574	0.779	0.279	0.411	0.714	0.229	0.347	0.577	1.628	16
	CFinder	83	0.253	0.475	0.472	0.442	0.807	0.597	0.795	0.317	0.453	0.771	0.267	0.396	0.649	1.778	13
	AP	115	0.256	0.463	0.379	0.322	0.630	0.451	0.565	0.308	0.399	0.487	0.233	0.315	0.571	1.568	17
	CMC	107	0.236	0.417	0.381	0.540	0.560	0.550	0.673	0.317	0.431	0.533	0.238	0.329	0.565	1.633	15
	ClusterOne	109	0.305	0.613	0.502	0.516	0.808	0.646	0.780	0.425	0.550	0.716	0.325	0.447	0.752	2.113	8
	PEWCC	175	0.289	0.471	0.312	0.463	0.700	0.570	0.731	0.367	0.488	0.400	0.292	0.337	0.627	1.818	12
	ProrankPlus	290	0.367	0.567	0.278	0.460	0.796	0.605	0.759	0.425	0.545	0.310	0.375	0.340	0.707	2.084	10
	DPC-NADPIN	422	0.384	0.600	0.202	0.433	0.827	0.598	0.682	0.429	0.527	0.223	0.392	0.284	0.668	2.109	9
	Core&Peel	132	0.195	0.333	0.250	0.513	0.492	0.502	0.621	0.238	0.344	0.364	0.200	0.258	0.453	1.374	18
	IMHRC	102	0.283	0.588	0.488	0.489	0.808	0.628	0.775	0.396	0.524	0.686	0.292	0.409	0.692	2.022	11
	PC2P	126	0.379	0.683	0.586	0.565	0.809	0.676	0.817	0.521	0.636	0.754	0.396	0.519	0.898	2.375	6
	CC	164	0.426	0.721	0.574	0.597	0.675	0.635	0.677	0.542	0.602	0.598	0.408	0.485	0.911	2.383	5
	WCC	157	0.432	0.717	0.587	0.604	0.708	0.654	0.745	0.571	0.646	0.662	0.433	0.524	0.956	2.448	2
	OCC	353	0.459	0.704	0.319	0.478	0.840	0.634	0.558	0.558	0.558	0.300	0.442	0.358	0.817	2.355	7
	OWCC	349	0.482	0.792	0.326	0.463	0.857	0.630	0.559	0.613	0.584	0.309	0.450	0.367	0.848	2.488	1
	CUBCO	148	0.420	0.737	0.580	0.548	0.808	0.665	0.669	0.584	0.623	0.588	0.416	0.487	0.908	2.446	3
	CUBCO+	136	0.437	0.701	0.574	0.590	0.773	0.675	0.647	0.576	0.610	0.581	0.446	0.505	0.942	2.423	4

SupplementaryTable 3. Comparative analysis of eight algorithms for prediction of protein complexes with respect to twelve performance measures as well as two composite scores.

Comparative analysis

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
KroganCore	MCL	102	0.300	0.432	0.498	0.352	0.840	0.544	0.824	0.352	0.493	0.775	0.299	0.432	0.732	1.769	11
	MCODE	54	0.132	0.250	0.374	0.469	0.388	0.427	0.685	0.163	0.263	0.611	0.125	0.208	0.340	1.072	17
	CFinder	73	0.202	0.337	0.406	0.426	0.630	0.518	0.877	0.269	0.412	0.795	0.220	0.344	0.546	1.469	15
	AP	136	0.289	0.466	0.377	0.271	0.701	0.436	0.588	0.330	0.422	0.522	0.269	0.355	0.644	1.613	13
	CMC	81	0.136	0.265	0.280	0.552	0.337	0.431	0.605	0.174	0.271	0.506	0.155	0.238	0.373	1.103	16
	ClusterOne	137	0.339	0.530	0.484	0.520	0.702	0.604	0.796	0.447	0.572	0.664	0.345	0.454	0.792	2.045	8
	PEWCC	177	0.221	0.345	0.257	0.464	0.527	0.494	0.802	0.288	0.424	0.362	0.242	0.290	0.511	1.484	14
	ProrankPlus	297	0.288	0.409	0.213	0.424	0.639	0.521	0.717	0.356	0.476	0.269	0.303	0.285	0.573	1.694	12
	DPC-NADPIN	438	0.312	0.439	0.179	0.451	0.674	0.551	0.721	0.367	0.487	0.189	0.314	0.236	0.548	1.789	10
	Core&Peel	130	0.108	0.201	0.143	0.503	0.288	0.381	0.477	0.133	0.207	0.231	0.114	0.152	0.261	0.897	18
	IMHRC	118	0.286	0.530	0.468	0.503	0.733	0.607	0.763	0.364	0.492	0.627	0.280	0.387	0.673	1.916	9
	PC2P	166	0.444	0.663	0.601	0.574	0.721	0.643	0.807	0.576	0.672	0.729	0.458	0.563	1.007	2.422	1
	CC	220	0.456	0.689	0.584	0.625	0.526	0.573	0.636	0.572	0.602	0.523	0.436	0.475	0.931	2.321	5
	WCC	219	0.459	0.693	0.587	0.632	0.539	0.583	0.639	0.572	0.604	0.525	0.436	0.476	0.935	2.339	4
	OCC	389	0.494	0.735	0.315	0.448	0.758	0.583	0.558	0.598	0.577	0.326	0.481	0.389	0.883	2.390	3
	OWCC	388	0.500	0.735	0.318	0.448	0.766	0.586	0.559	0.610	0.583	0.343	0.504	0.408	0.907	2.404	2
	CUBCO	214	0.413	0.704	0.527	0.595	0.658	0.625	0.467	0.563	0.511	0.336	0.362	0.349	0.762	2.253	6
	CUBCO+	201	0.420	0.722	0.484	0.585	0.711	0.645	0.403	0.549	0.465	0.313	0.389	0.347	0.767	2.252	7

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
KroganExt	MCL	33	0.083	0.117	0.250	0.098	0.960	0.307	0.667	0.089	0.156	0.606	0.071	0.127	0.210	0.664	18
	MCODE	39	0.084	0.128	0.317	0.339	0.375	0.356	0.692	0.103	0.179	0.667	0.092	0.162	0.246	0.747	17
	CFinder	57	0.133	0.220	0.309	0.256	0.638	0.404	0.789	0.170	0.280	0.684	0.138	0.230	0.363	1.037	15
	AP	131	0.174	0.309	0.300	0.263	0.539	0.377	0.397	0.199	0.265	0.344	0.160	0.218	0.392	1.124	14
	CMC	97	0.158	0.280	0.295	0.520	0.362	0.433	0.629	0.213	0.318	0.485	0.167	0.248	0.406	1.190	13
	ClusterOne	116	0.263	0.411	0.442	0.533	0.568	0.551	0.862	0.344	0.492	0.724	0.298	0.422	0.685	1.716	8
	PEWCC	248	0.234	0.358	0.204	0.433	0.521	0.475	0.718	0.291	0.414	0.278	0.245	0.260	0.494	1.481	11
	ProrankPlus	185	0.216	0.323	0.254	0.456	0.529	0.491	0.692	0.270	0.388	0.351	0.230	0.278	0.495	1.418	12
	DPC-NADPIN	472	0.267	0.401	0.144	0.412	0.650	0.517	0.627	0.316	0.420	0.155	0.259	0.194	0.461	1.605	10
	Core&Peel	149	0.119	0.209	0.156	0.497	0.310	0.393	0.510	0.149	0.231	0.242	0.128	0.167	0.286	0.952	16
	IMHRC	146	0.246	0.475	0.368	0.422	0.702	0.545	0.568	0.298	0.391	0.445	0.230	0.304	0.550	1.657	9
	PC2P	179	0.380	0.571	0.550	0.538	0.646	0.589	0.670	0.475	0.556	0.592	0.376	0.460	0.840	2.096	2
	CC	232	0.388	0.617	0.525	0.585	0.505	0.543	0.539	0.479	0.507	0.470	0.387	0.424	0.812	2.055	3
	WCC	224	0.394	0.621	0.544	0.599	0.523	0.560	0.580	0.500	0.537	0.482	0.383	0.427	0.821	2.112	1
	OCC	445	0.376	0.596	0.199	0.358	0.730	0.511	0.391	0.436	0.412	0.225	0.355	0.275	0.651	1.896	5
	OWCC	421	0.397	0.635	0.213	0.354	0.735	0.510	0.390	0.472	0.427	0.245	0.365	0.293	0.690	1.969	4
	CUBCO	322	0.355	0.653	0.443	0.590	0.544	0.567	0.248	0.452	0.321	0.149	0.241	0.184	0.539	1.896	6
	CUBCO+	294	0.349	0.627	0.433	0.607	0.515	0.559	0.204	0.411	0.273	0.136	0.253	0.177	0.526	1.807	7

SupplementaryTable 3. Comparative analysis of eight algorithms for prediction of protein complexes with respect to twelve performance measures as well as two composite scores.

Comparative analysis

Human - Corum

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
STRING	MCL	352	0.085	0.585	0.239	0.136	0.793	0.329	0.821	0.385	0.524	0.685	0.081	0.145	0.230	1.523	5
	MCODE	114	0.026	0.201	0.157	0.145	0.379	0.234	0.763	0.121	0.209	0.728	0.028	0.054	0.080	0.669	16
	CFinder	119	0.030	0.266	0.160	0.125	0.570	0.267	0.866	0.147	0.252	0.807	0.032	0.062	0.092	0.814	14
	AP	327	0.071	0.468	0.188	0.091	0.737	0.259	0.740	0.316	0.443	0.618	0.068	0.122	0.194	1.241	7
	CMC	132	0.023	0.134	0.094	0.148	0.284	0.205	0.636	0.090	0.157	0.523	0.023	0.044	0.067	0.519	17
	ClusterOne	243	0.054	0.422	0.183	0.129	0.652	0.289	0.794	0.237	0.365	0.646	0.053	0.098	0.151	1.131	8
	PEWCC	338	0.046	0.252	0.086	0.123	0.526	0.255	0.586	0.148	0.237	0.391	0.044	0.080	0.126	0.790	15
	ProrankPlus	587	0.084	0.352	0.081	0.141	0.580	0.286	0.714	0.238	0.357	0.443	0.087	0.146	0.230	1.078	11
	DPC-NADPIN	721	0.090	0.343	0.070	0.143	0.613	0.296	0.678	0.236	0.350	0.383	0.093	0.149	0.239	1.080	10
	Core&Peel	206	0.026	0.092	0.049	0.143	0.242	0.186	0.515	0.060	0.108	0.374	0.026	0.048	0.074	0.412	18
	IMHRC	210	0.048	0.401	0.190	0.127	0.732	0.305	0.762	0.198	0.315	0.657	0.046	0.087	0.134	1.068	12
	PC2P	347	0.081	0.562	0.236	0.137	0.751	0.320	0.807	0.384	0.520	0.674	0.079	0.141	0.222	1.483	6
	CC	443	0.093	0.611	0.236	0.147	0.555	0.286	0.729	0.452	0.558	0.585	0.087	0.151	0.244	1.548	3
	WCC	443	0.093	0.611	0.236	0.147	0.555	0.286	0.731	0.450	0.558	0.582	0.087	0.151	0.244	1.547	4
	OCC	738	0.122	0.665	0.158	0.151	0.786	0.344	0.654	0.459	0.539	0.470	0.117	0.187	0.309	1.671	1
	OWCC	737	0.121	0.657	0.158	0.151	0.786	0.345	0.655	0.455	0.537	0.461	0.114	0.183	0.304	1.659	2
	CUBCO	371	0.038	0.400	0.149	0.099	0.737	0.270	0.251	0.279	0.264	0.097	0.020	0.033	0.071	0.973	13
	CUBCO+	275	0.040	0.490	0.147	0.108	0.814	0.296	0.222	0.316	0.261	0.127	0.028	0.045	0.085	1.086	9

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
PIPS	MCL	50	0.013	0.091	0.113	0.032	0.937	0.172	0.720	0.074	0.134	0.520	0.011	0.021	0.034	0.410	13
	MCODE	32	0.006	0.059	0.106	0.069	0.292	0.142	0.406	0.015	0.029	0.281	0.004	0.007	0.013	0.236	18
	CFinder	36	0.008	0.062	0.091	0.043	0.621	0.164	0.556	0.023	0.044	0.417	0.006	0.012	0.020	0.277	16
	AP	116	0.022	0.181	0.128	0.052	0.671	0.188	0.509	0.109	0.179	0.302	0.015	0.028	0.050	0.570	9
	CMC	68	0.009	0.105	0.077	0.057	0.359	0.143	0.338	0.065	0.110	0.235	0.007	0.013	0.023	0.367	14
	ClusterOne	83	0.015	0.131	0.125	0.075	0.476	0.189	0.386	0.049	0.086	0.301	0.010	0.020	0.035	0.422	11
	PEWCC	204	0.019	0.134	0.046	0.029	0.511	0.122	0.221	0.057	0.091	0.142	0.012	0.022	0.041	0.366	15
	ProrankPlus	212	0.030	0.235	0.060	0.055	0.568	0.176	0.396	0.097	0.156	0.250	0.022	0.041	0.071	0.597	8
	DPC-NADPIN	364	0.036	0.182	0.049	0.044	0.677	0.172	0.250	0.072	0.111	0.148	0.023	0.039	0.075	0.502	10
	Core&Peel	123	0.010	0.064	0.047	0.059	0.300	0.133	0.203	0.027	0.047	0.138	0.007	0.014	0.024	0.254	17
	IMHRC	96	0.016	0.104	0.127	0.062	0.699	0.208	0.354	0.052	0.090	0.292	0.012	0.023	0.038	0.418	12
	PC2P	133	0.028	0.235	0.168	0.078	0.644	0.224	0.556	0.132	0.214	0.301	0.017	0.032	0.059	0.700	6
	CC	181	0.037	0.355	0.186	0.098	0.510	0.224	0.630	0.193	0.296	0.293	0.022	0.041	0.078	0.911	2
	WCC	146	0.032	0.275	0.173	0.083	0.582	0.220	0.651	0.196	0.301	0.336	0.021	0.039	0.071	0.828	3
	OCC	314	0.040	0.275	0.088	0.044	0.793	0.186	0.347	0.150	0.209	0.169	0.022	0.039	0.079	0.710	5
	OWCC	266	0.038	0.282	0.095	0.042	0.812	0.184	0.410	0.180	0.250	0.184	0.021	0.037	0.075	0.754	4
	CUBCO	216	0.044	0.381	0.186	0.088	0.542	0.219	0.694	0.321	0.439	0.227	0.021	0.038	0.082	1.083	1
	CUBCO+	111	0.025	0.197	0.160	0.071	0.680	0.219	0.604	0.140	0.228	0.288	0.014	0.028	0.052	0.669	7

SupplementaryTable 3. Comparative analysis of eight algorithms for prediction of protein complexes with respect to twelve performance measures as well as two composite scores.

Comparative analysis

E.coli - Ecocyc

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
	MCL	71	0.126	0.294	0.378	0.284	0.687	0.442	0.423	0.165	0.237	0.254	0.083	0.125	0.251	1.099	6
	MCODE	16	0.027	0.055	0.224	0.197	0.294	0.241	0.375	0.041	0.074	0.313	0.023	0.043	0.070	0.397	17
	CFinder	29	0.054	0.115	0.225	0.161	0.678	0.330	0.552	0.087	0.151	0.345	0.046	0.081	0.135	0.649	15
	AP	37	0.066	0.151	0.300	0.175	0.759	0.364	0.432	0.092	0.151	0.270	0.046	0.078	0.144	0.733	13
	CMC	24	0.033	0.133	0.172	0.221	0.366	0.284	0.208	0.037	0.062	0.167	0.018	0.033	0.066	0.513	16
	ClusterOne	30	0.057	0.110	0.239	0.537	0.205	0.332	0.633	0.092	0.160	0.433	0.060	0.105	0.162	0.659	14
	PEWCC	158	0.092	0.239	0.124	0.191	0.545	0.323	0.196	0.124	0.152	0.089	0.064	0.074	0.166	0.805	11
	ProrankPlus	33	0.076	0.142	0.284	0.391	0.282	0.332	0.758	0.115	0.199	0.485	0.073	0.127	0.203	0.749	12
Babu	DPCNADPIN	109	0.111	0.229	0.184	0.253	0.589	0.386	0.358	0.133	0.194	0.147	0.073	0.098	0.209	0.921	10
	Core&Peel	52	0.021	0.050	0.079	0.330	0.163	0.232	0.038	0.009	0.015	0.038	0.009	0.015	0.036	0.318	18
	IMHRC	84	0.120	0.275	0.278	0.323	0.589	0.436	0.393	0.147	0.214	0.190	0.073	0.106	0.226	1.046	8
	PC2P	89	0.182	0.362	0.441	0.372	0.634	0.486	0.506	0.243	0.328	0.292	0.119	0.169	0.352	1.359	5
	CC	107	0.207	0.399	0.470	0.424	0.590	0.501	0.495	0.298	0.372	0.308	0.151	0.203	0.410	1.479	4
	WCC	106	0.209	0.408	0.472	0.428	0.589	0.502	0.509	0.307	0.383	0.321	0.156	0.210	0.419	1.502	3
	OCC	193	0.165	0.372	0.159	0.161	0.808	0.361	0.176	0.193	0.184	0.093	0.083	0.088	0.252	1.081	7
	OWCC	189	0.160	0.344	0.159	0.161	0.821	0.363	0.148	0.161	0.154	0.079	0.069	0.074	0.233	1.021	9
	CUBCO	137	0.228	0.431	0.468	0.435	0.541	0.485	0.453	0.344	0.391	0.190	0.119	0.146	0.374	1.535	1
	CUBCO+	140	0.226	0.451	0.465	0.426	0.530	0.475	0.407	0.324	0.361	0.186	0.122	0.147	0.373	1.512	2

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
	MCL	118	0.405	0.627	0.667	0.500	0.969	0.696	0.864	0.490	0.625	0.814	0.398	0.535	0.940	2.353	7
	MCODE	31	0.102	0.199	0.359	0.621	0.240	0.386	0.968	0.187	0.313	0.774	0.100	0.176	0.278	1.000	10
	CFinder	27	0.093	0.170	0.334	0.605	0.232	0.375	0.963	0.158	0.271	0.889	0.100	0.179	0.272	0.908	13
	AP	138	0.466	0.726	0.700	0.587	0.911	0.731	0.899	0.589	0.712	0.826	0.473	0.602	1.067	2.635	4
	CMC	34	0.092	0.170	0.304	0.611	0.185	0.336	0.765	0.149	0.250	0.676	0.095	0.167	0.259	0.848	16
	ClusterOne	117	0.315	0.581	0.504	0.569	0.659	0.613	0.829	0.477	0.606	0.641	0.311	0.419	0.734	2.114	8
	PEWCC	41	0.078	0.203	0.251	0.443	0.271	0.346	0.683	0.170	0.272	0.415	0.071	0.121	0.199	0.900	14
	ProrankPlus	39	0.104	0.191	0.282	0.529	0.234	0.352	0.897	0.166	0.280	0.718	0.116	0.200	0.304	0.927	12
Cong	DPCNADPIN	59	0.118	0.199	0.230	0.458	0.293	0.367	0.763	0.166	0.273	0.492	0.120	0.193	0.311	0.956	11
	Core&Peel	47	0.096	0.170	0.262	0.558	0.199	0.334	0.681	0.154	0.251	0.511	0.100	0.167	0.263	0.850	15
	IMHRC	109	0.306	0.564	0.521	0.587	0.649	0.617	0.853	0.456	0.595	0.661	0.299	0.411	0.717	2.082	9
	PC2P	166	0.548	0.888	0.736	0.676	0.830	0.749	0.898	0.780	0.835	0.801	0.552	0.654	1.201	3.019	2
	CC	186	0.562	0.884	0.731	0.703	0.737	0.720	0.844	0.772	0.806	0.726	0.560	0.632	1.194	2.972	3
	WCC	186	0.562	0.884	0.731	0.703	0.737	0.720	0.844	0.772	0.806	0.726	0.560	0.632	1.194	2.972	3
	OCC	225	0.605	0.934	0.617	0.600	0.854	0.716	0.813	0.846	0.830	0.649	0.606	0.627	1.231	3.084	1
	OWCC	225	0.605	0.934	0.617	0.600	0.854	0.716	0.813	0.846	0.830	0.649	0.606	0.627	1.231	3.084	1
	CUBCO	171	0.422	0.717	0.617	0.672	0.735	0.703	0.515	0.627	0.565	0.333	0.343	0.338	0.760	2.407	6
	CUBCO+	164	0.414	0.738	0.623	0.676	0.765	0.719	0.482	0.619	0.542	0.311	0.319	0.315	0.729	2.413	5

SupplementaryTable 3. Comparative analysis of eight algorithms for prediction of protein complexes with respect to twelve performance measures as well as two composite scores.

Comparative analysis

E.coli - Met

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
	MCL	21	0.068	0.126	0.248	0.121	0.930	0.335	0.714	0.115	0.198	0.429	0.052	0.092	0.160	0.727	14
	MCODE	12	0.027	0.086	0.237	0.357	0.216	0.278	0.417	0.040	0.073	0.250	0.017	0.032	0.060	0.465	17
	CFinder	21	0.044	0.086	0.219	0.174	0.622	0.329	0.429	0.080	0.135	0.333	0.040	0.072	0.115	0.594	15
	AP	48	0.088	0.224	0.320	0.241	0.615	0.385	0.396	0.155	0.223	0.188	0.052	0.081	0.169	0.920	11
	CMC	23	0.044	0.098	0.193	0.466	0.178	0.288	0.391	0.080	0.133	0.217	0.029	0.051	0.095	0.564	16
	ClusterOne	96	0.155	0.408	0.261	0.330	0.718	0.487	0.323	0.224	0.265	0.177	0.098	0.126	0.281	1.314	6
	PEWCC	91	0.096	0.213	0.168	0.330	0.460	0.390	0.308	0.132	0.185	0.154	0.080	0.106	0.202	0.883	12
	ProrankPlus	27	0.082	0.138	0.263	0.445	0.246	0.331	0.630	0.126	0.211	0.593	0.092	0.159	0.241	0.762	13
Babu	DPCNADPIN	85	0.112	0.264	0.179	0.300	0.603	0.425	0.365	0.161	0.223	0.165	0.080	0.108	0.220	1.025	10
	Core&Peel	19	0.006	0.017	0.051	0.488	0.061	0.173	0.053	0.011	0.019	0.053	0.006	0.010	0.017	0.215	18
	IMHRC	70	0.126	0.293	0.297	0.311	0.671	0.457	0.314	0.144	0.197	0.157	0.063	0.090	0.216	1.073	9
	PC2P	67	0.169	0.391	0.414	0.351	0.655	0.479	0.552	0.259	0.352	0.269	0.103	0.149	0.319	1.392	5
	CC	83	0.207	0.420	0.463	0.445	0.577	0.507	0.578	0.345	0.432	0.361	0.172	0.233	0.441	1.566	2
	WCC	81	0.194	0.379	0.438	0.420	0.563	0.487	0.543	0.310	0.395	0.346	0.161	0.220	0.414	1.455	4
	OCC	135	0.184	0.448	0.194	0.224	0.768	0.415	0.244	0.218	0.231	0.119	0.092	0.104	0.288	1.278	8
	OWCC	134	0.201	0.431	0.198	0.229	0.765	0.418	0.246	0.230	0.238	0.142	0.109	0.123	0.325	1.289	7
	CUBCO	108	0.239	0.517	0.439	0.406	0.556	0.475	0.519	0.408	0.457	0.194	0.121	0.149	0.388	1.688	1
	CUBCO+	107	0.214	0.452	0.448	0.432	0.509	0.469	0.467	0.351	0.401	0.168	0.107	0.131	0.345	1.537	3

Data-set	Method	# Clusters	MMR	FRM	SEP	PPV	SN	ACC	Prec	Rec	F-measure	prec+	rec+	f-measure+	MMR + f-measure+	Composite Score (CS) MMR + FRM + ACC + F-measure	CS Ranking
	MCL	83	0.441	0.760	0.666	0.551	0.930	0.716	0.867	0.630	0.730	0.795	0.429	0.557	0.998	2.646	5
	MCODE	20	0.103	0.156	0.360	0.844	0.180	0.390	0.950	0.143	0.248	0.950	0.123	0.218	0.321	0.897	10
	CFinder	18	0.091	0.143	0.342	0.813	0.175	0.378	1.000	0.136	0.240	1.000	0.117	0.209	0.301	0.852	13
	AP	96	0.504	0.818	0.695	0.630	0.881	0.745	0.906	0.740	0.815	0.833	0.519	0.640	1.144	2.881	4
	CMC	20	0.085	0.143	0.324	0.870	0.147	0.358	0.850	0.123	0.215	0.850	0.110	0.195	0.280	0.801	15
	ClusterOne	68	0.301	0.455	0.484	0.656	0.603	0.629	0.897	0.435	0.586	0.750	0.331	0.459	0.760	1.970	8
	PEWCC	20	0.065	0.136	0.283	0.588	0.208	0.350	0.750	0.123	0.212	0.500	0.065	0.115	0.179	0.762	16
	ProrankPlus	28	0.105	0.162	0.281	0.685	0.203	0.373	0.857	0.136	0.235	0.714	0.130	0.220	0.325	0.876	12
Cong	DPCNADPIN	35	0.110	0.149	0.248	0.713	0.227	0.402	0.800	0.136	0.233	0.514	0.117	0.190	0.300	0.894	11
	Core&Peel	24	0.092	0.143	0.304	0.780	0.157	0.349	0.833	0.130	0.225	0.750	0.117	0.202	0.294	0.809	14
	IMHRC	63	0.297	0.455	0.506	0.644	0.596	0.620	0.889	0.416	0.566	0.778	0.318	0.452	0.749	1.938	9
	PC2P	105	0.552	0.877	0.713	0.677	0.834	0.752	0.905	0.857	0.880	0.819	0.558	0.664	1.216	3.061	2
	CC	114	0.528	0.929	0.700	0.682	0.734	0.707	0.851	0.792	0.820	0.719	0.532	0.612	1.140	2.984	3
	WCC	114	0.528	0.929	0.700	0.682	0.734	0.707	0.851	0.792	0.820	0.719	0.532	0.612	1.140	2.984	3
	OCC	133	0.565	0.929	0.615	0.645	0.843	0.738	0.857	0.812	0.834	0.654	0.565	0.606	1.172	3.065	1
	OWCC	133	0.565	0.929	0.615	0.645	0.843	0.738	0.857	0.812	0.834	0.654	0.565	0.606	1.172	3.065	1
	CUBCO	105	0.389	0.771	0.614	0.644	0.782	0.710	0.590	0.695	0.638	0.390	0.313	0.347	0.736	2.508	7
	CUBCO+	103	0.388	0.808	0.586	0.604	0.820	0.704	0.534	0.712	0.610	0.388	0.320	0.351	0.738	2.510	6