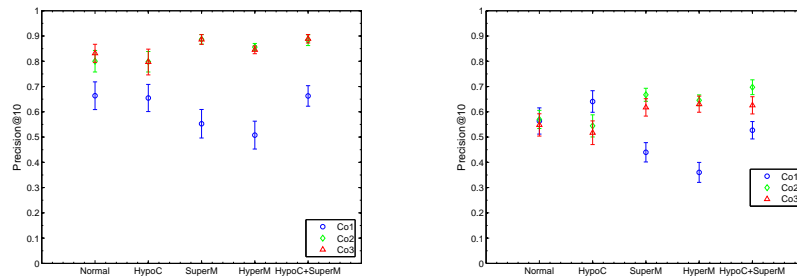


# 1. Supplementary Material

## 1.1. Performance Analysis

### Mean and Confidence intervals - *Precision10* and *Recall*.

(a) *Precision10* - Query performance on the training set.



(b) *Recall* - Query performance on the test set.

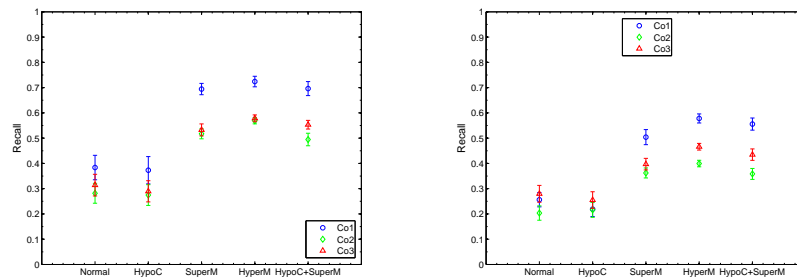


Figure S1: Confidence intervals at the 95% level for the mean values of *Precision10* and *Recall* evaluated on the training set using the queries evolved for the topics BODY PAINTING (left) and BIOINFORMATICS (right).

## 1.2. Diversity Preservation Analysis

### *Similarity* - Single population of queries.

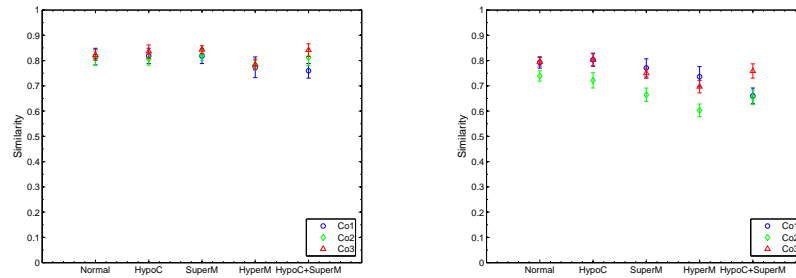


Figure S2: Confidence intervals at the 95% level for the mean values of the *Similarity* among the queries evolved using a single population of queries for the topics BODY PAINTING (left) and BIOINFORMATICS (right).

### *Similarity* - Multiple population of queries.

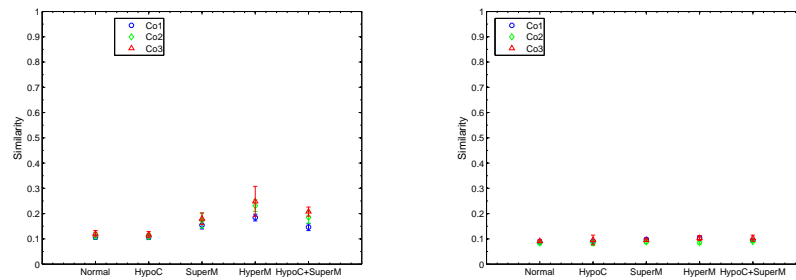


Figure S3: Confidence intervals at the 95% level for the mean values of the *Similarity* among the queries evolved using multiple populations of queries for the topics BODY PAINTING (left) and BIOINFORMATICS (right).

Pareto fronts for objectives *Precision10* and *Recall* based on maximum cardinality - Single population of queries evaluated on the training set.

Co

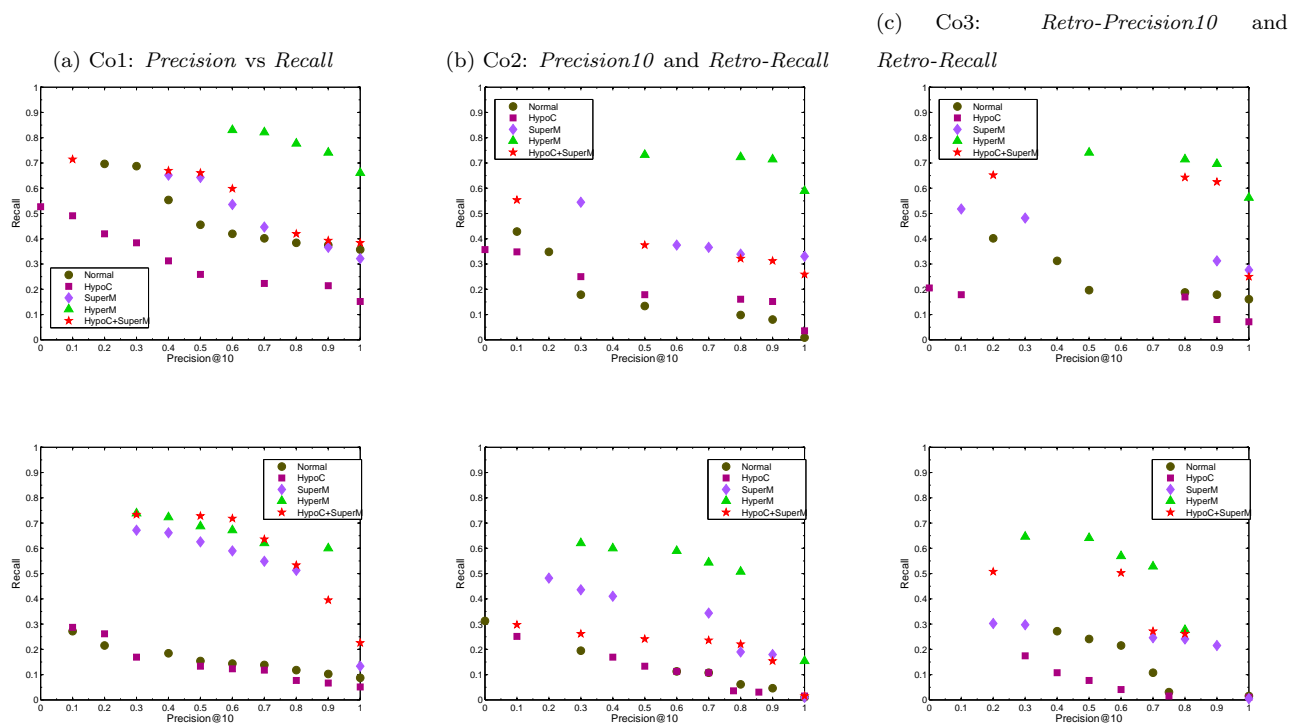


Figure S4: Pareto fronts of a **single population of queries** evaluated on the training set for the topics BODY PAINTING (top) and BIOINFORMATICS (bottom) when the pair of objectives to be maximized are given by combinations **Co1** (left), **Co2** (center) and **Co3** (right). The reported results correspond to the runs with Pareto fronts of maximum cardinality.

Pareto fronts for objectives *Precision10* and *Recall* based on maximum cardinality - Multiple populations of queries evaluated on the training set.

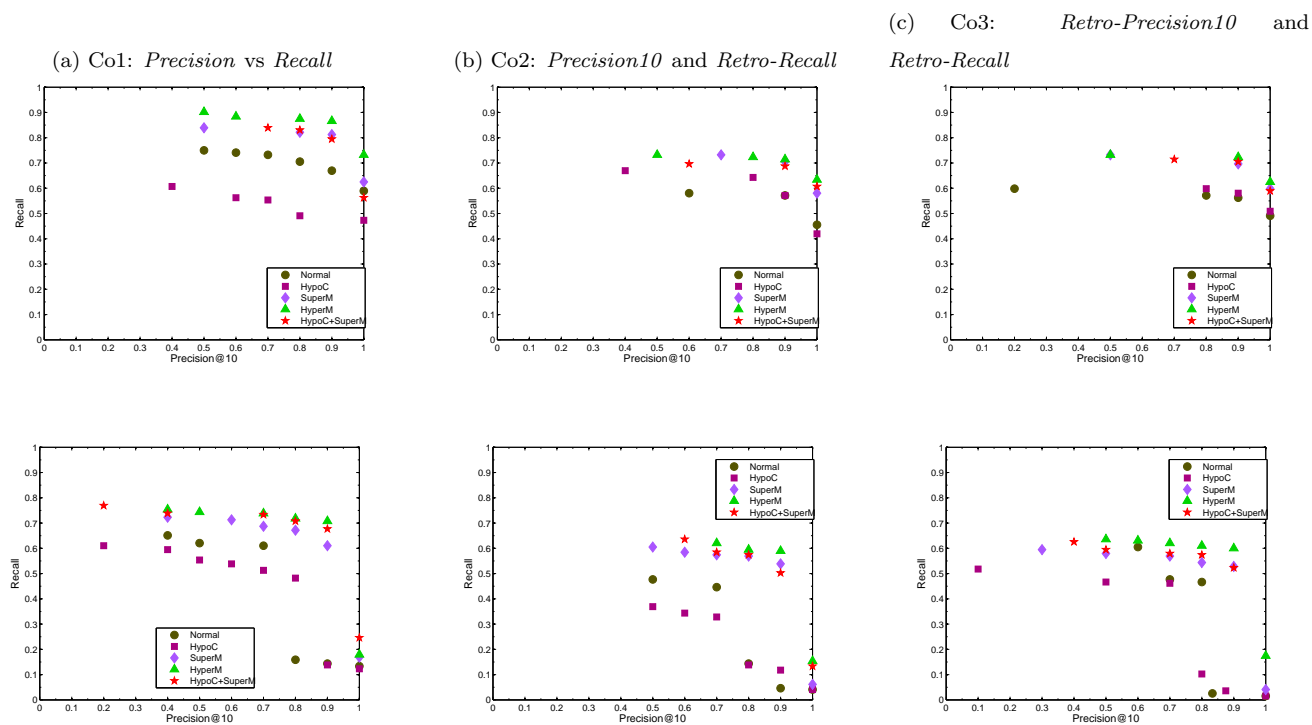


Figure S5: Pareto fronts of **multiple populations of queries** evaluated on the training set for the topics BODY PAINTING (top) and BIOINFORMATICS (bottom) when the pair of objectives to be maximized are given by combinations **Co1** (left), **Co2** (center) and **Co3** (right). The reported results correspond to the runs with Pareto fronts of maximum cardinality.

Pareto fronts for objectives *Precision10* and *Recall* based on maximum cardinality - Single population of queries evaluated on the testing set.

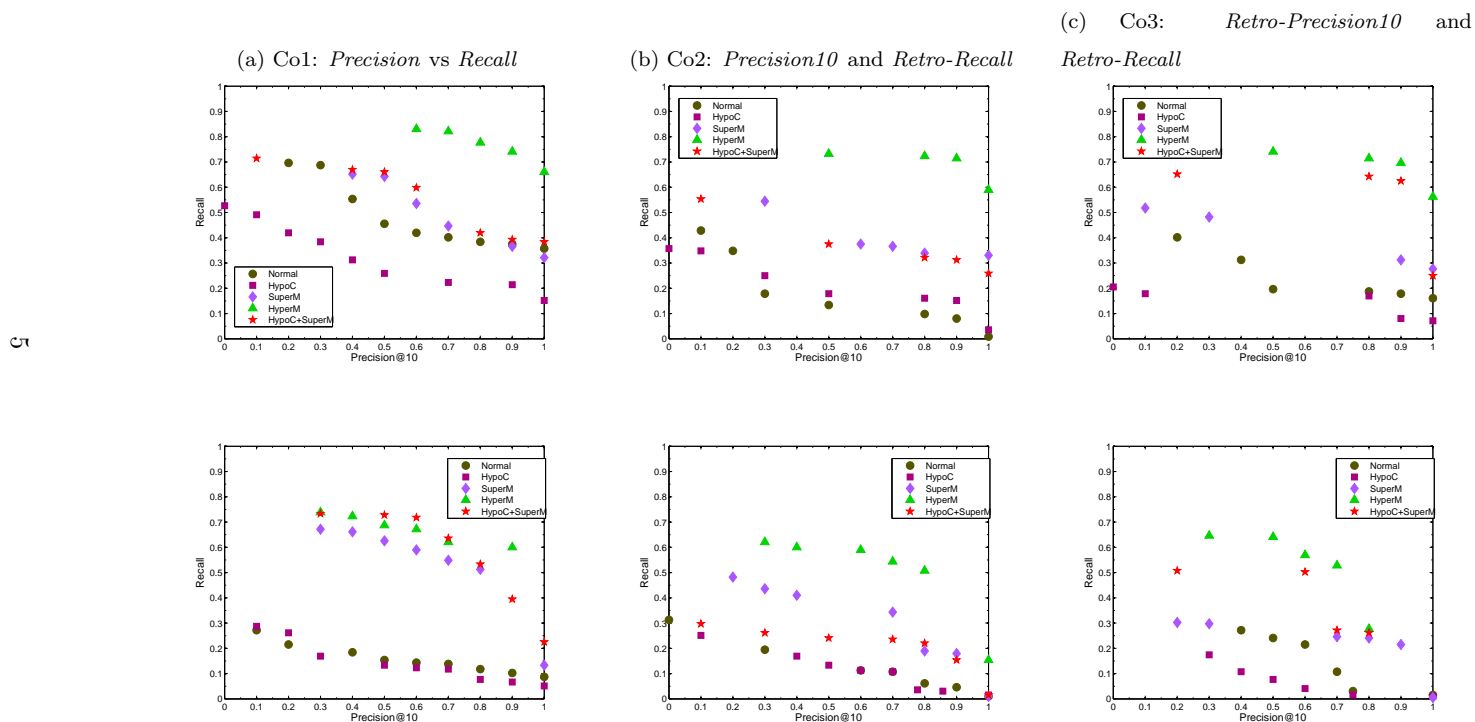


Figure S6: Pareto fronts of a **single population of queries** evaluated on the testing set for the topics **BODY PAINTING** (top) and **BIOINFORMATICS** (bottom) when the pair of objectives to be maximized are given by combinations **Co1** (left), **Co2** (center) and **Co3** (right). The reported results correspond to the runs with Pareto fronts of maximum cardinality.

Pareto fronts for objectives *Precision10* and *Recall* based on maximum cardinality - Multiple populations of queries evaluated on the testing set.

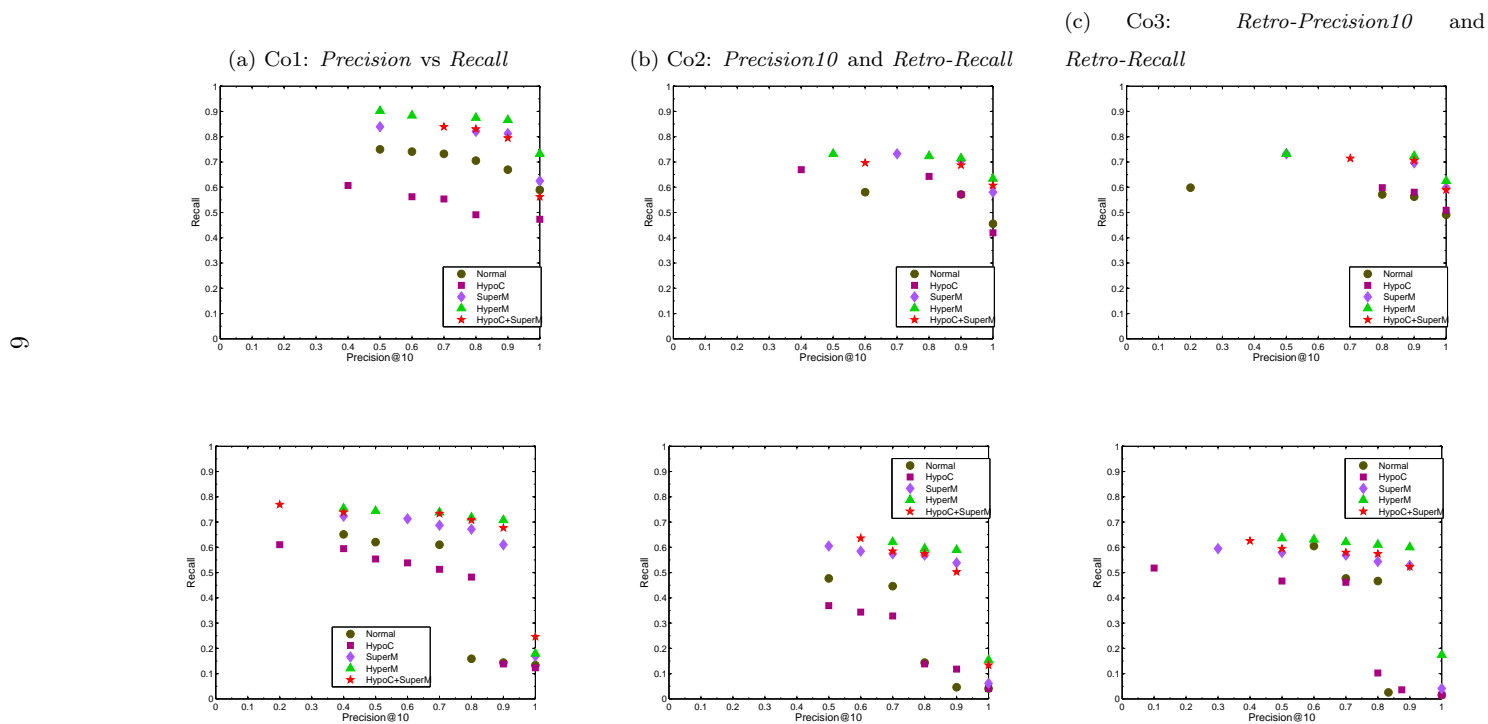


Figure S7: Pareto fronts of **multiple populations of queries** evaluated on the testing set for the topics BODY PAINTING (top) and BIOINFORMATICS (bottom) when the pair of objectives to be maximized are given by combinations **Co1** (left), **Co2** (center) and **Co3** (right). The reported results correspond to the runs with Pareto fronts of maximum cardinality.

## Supplementary Material - Global Performance Analysis

*Global-Recall* - Evolution on the training set for a single population of queries.

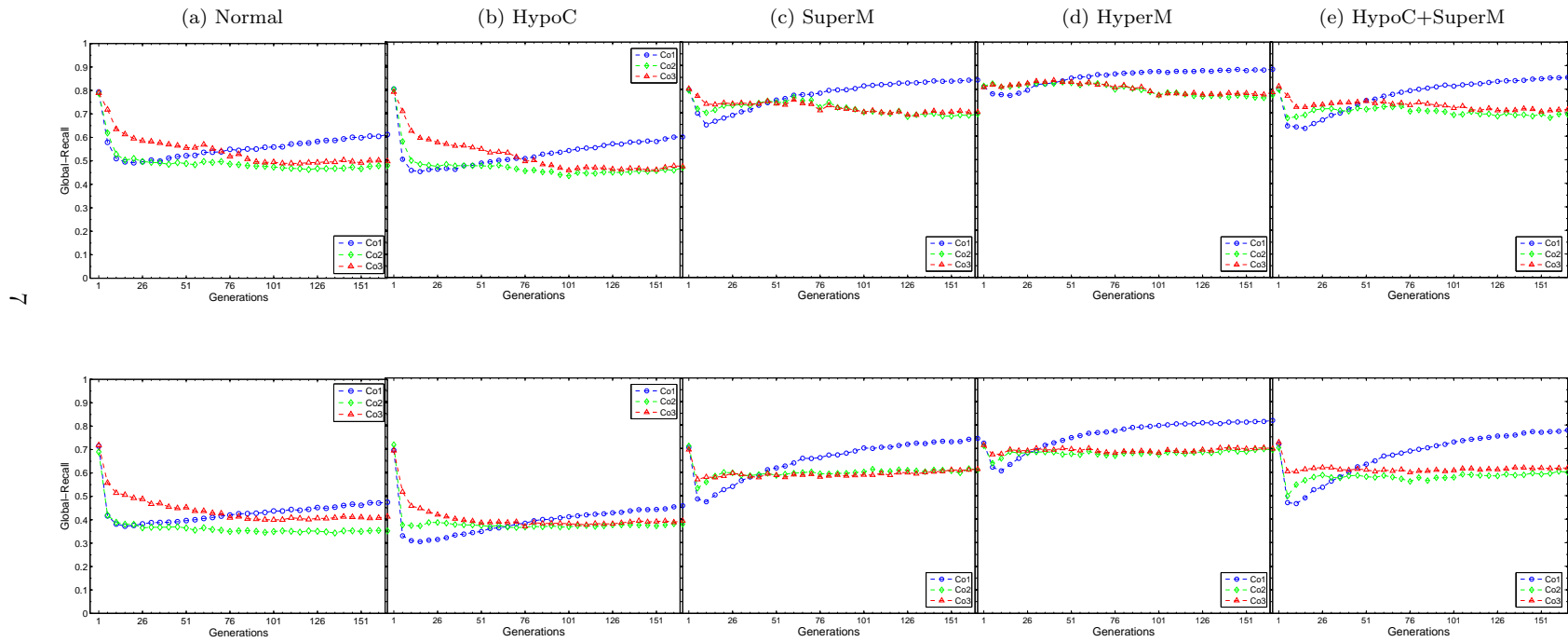


Figure S8: The evolution of *Global-Recall* for the topics **BODY PAINTING** (top) and **BIOINFORMATICS** (bottom) using a single population of queries when the pair of objectives to be maximized are given by combinations **Co1**, **Co2** and **Co3**.

*Global-Recall* - Evolution on the training set for multiple populations of queries.

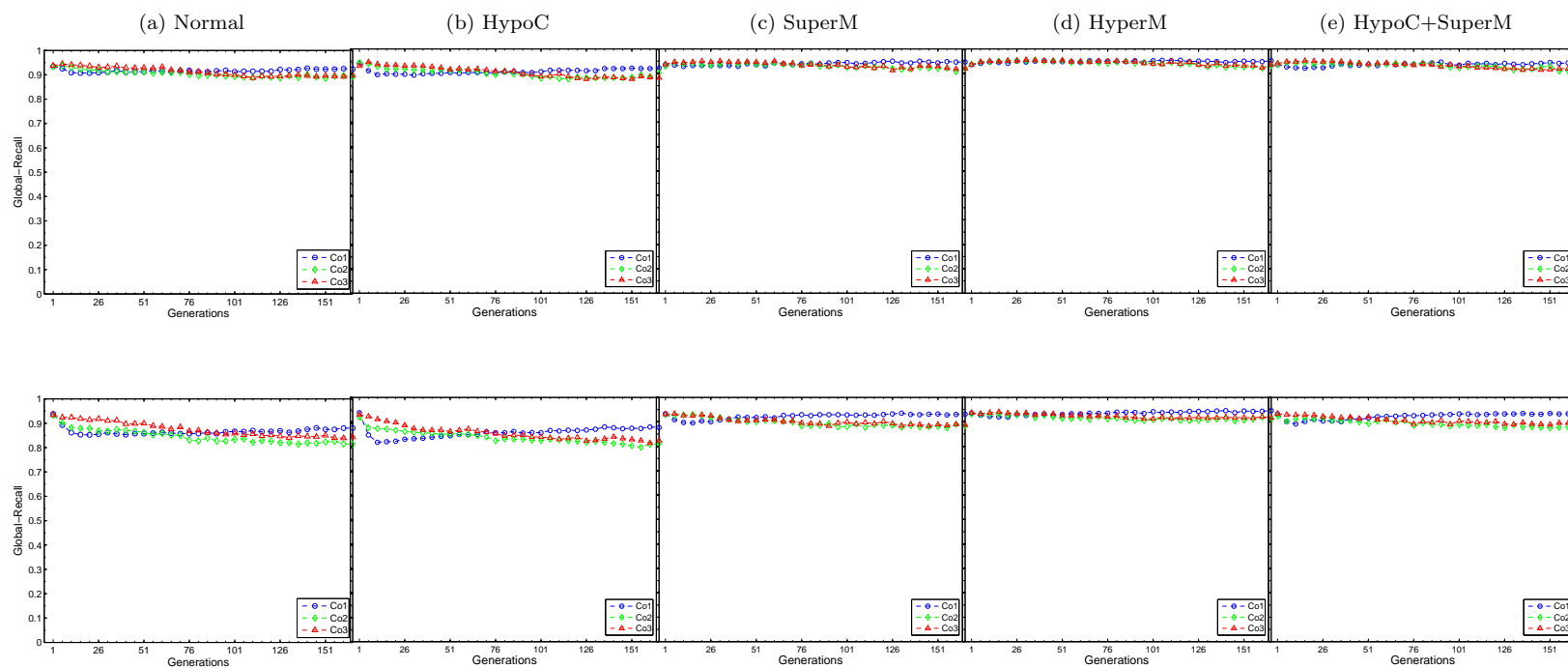


Figure S9: The evolution of *Global-Recall* for the topics BODY PAINTING (top) and BIOINFORMATICS (bottom) using **multiple population of queries** when the pair of objectives to be maximized are given by combinations **Co1**, **Co2** and **Co3**.



*Global-Recall* - Evolution on the test set for a single population of queries.

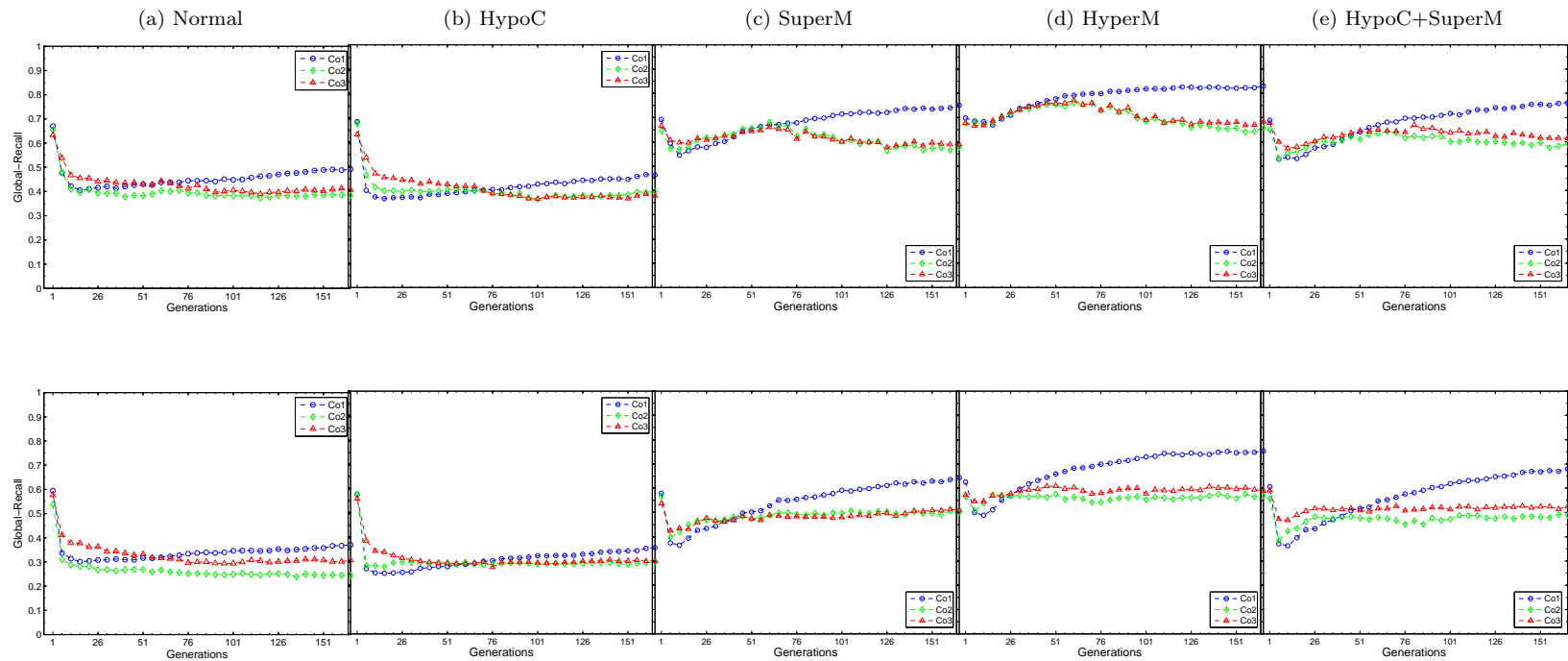


Figure S10: The evolution of *Global-Recall* for the topics BODY PAINTING (top) and BIOINFORMATICS (bottom) using a single population of queries when the pair of objectives to be maximized are given by combinations **Co1**, **Co2** and **Co3**.

*Global-Recall* - Evolution on the test set for multiple populations of queries.

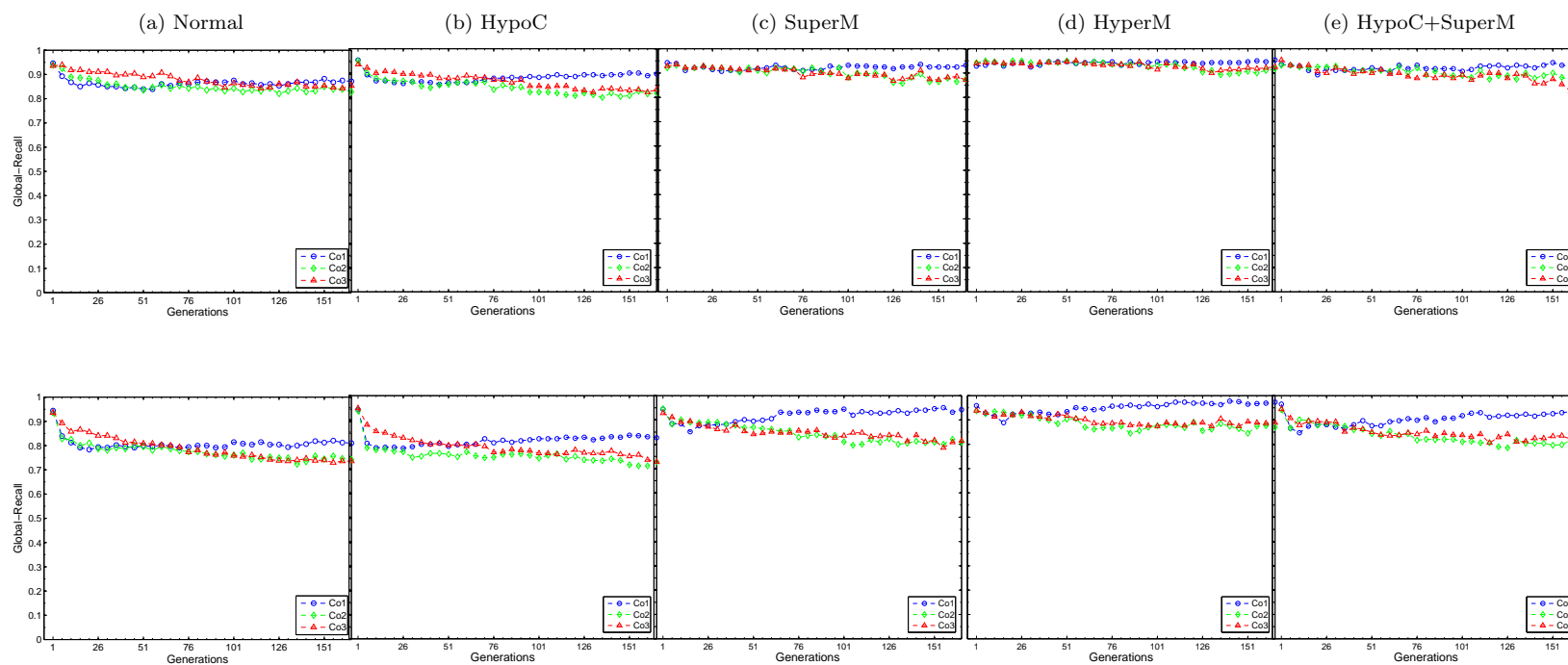
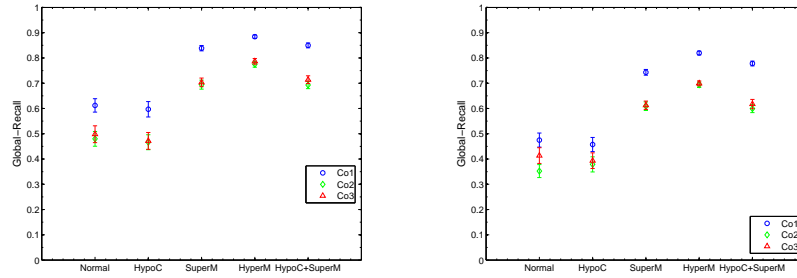


Figure S11: Evaluating *Global-Recall* on the test set using the queries evolved for the topics BODY PAINTING (top) and BIOINFORMATICS (bottom) using multiple populations of queries when the pair of objectives to be maximized are given by combinations **Co1**, **Co2** and **Co3**.

### Mean and Confidence intervals - *Global-Recall*.

(a) Query performance on the training set using a single population of queries.



(b) Query performance on the test training using multiple populations of queries.

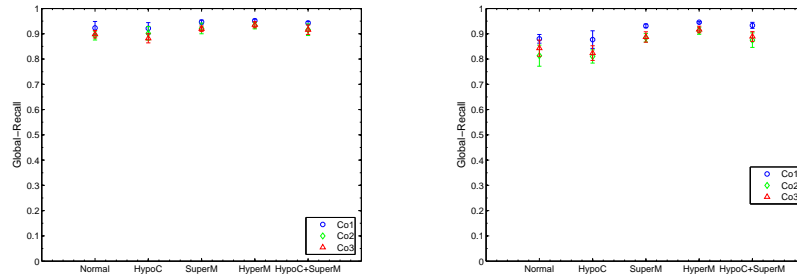
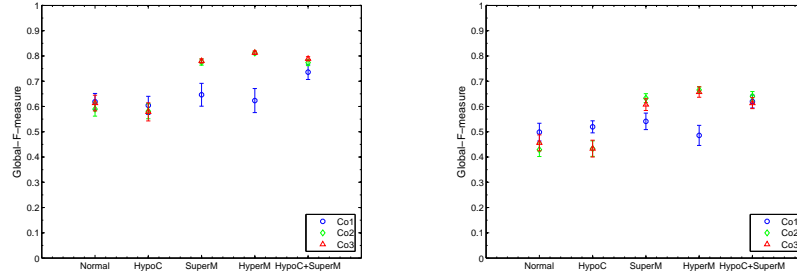


Figure S12: Confidence intervals at the 95% level for the mean values of *Global-Recall* evaluated on the training set using the queries evolved using a **single population of queries** (top) and **multiple populations of queries** (bottom) for the topics BODY PAINTING (left) and BIOINFORMATICS (right).

Mean and Confidence intervals - *Global-F-measure*.

(a) Query performance on the training set using a single population of queries.



(b) Query performance on the training set using multiple populations of queries.

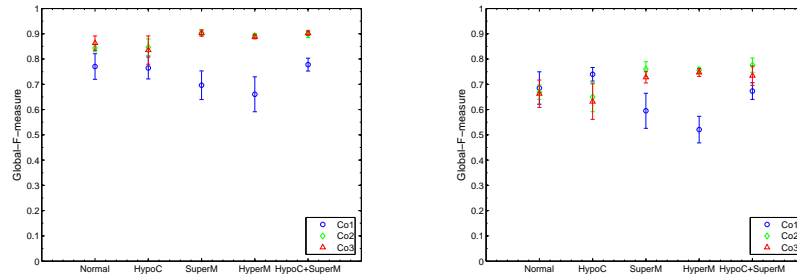


Figure S13: Confidence intervals at the 95% level for the mean values of *Global-F-measure* evaluated on the training set using the queries evolved using a **single population of queries** (top) and **multiple populations of queries** (bottom) for the topics BODY PAINTING (left) and BIOINFORMATICS (right).