



Tesi di Laurea Triennale in Informatica

***Integrazione di due nuove tecniche
di apprendimento automatico***

nel Progetto

DAME

Tutor Accademico:

Dott.ssa Anna Corazza

Tutor Aziendale:

Dott. Massimo Brescia

Candidato:

Marisa Guglielmo

Matricola:50/524

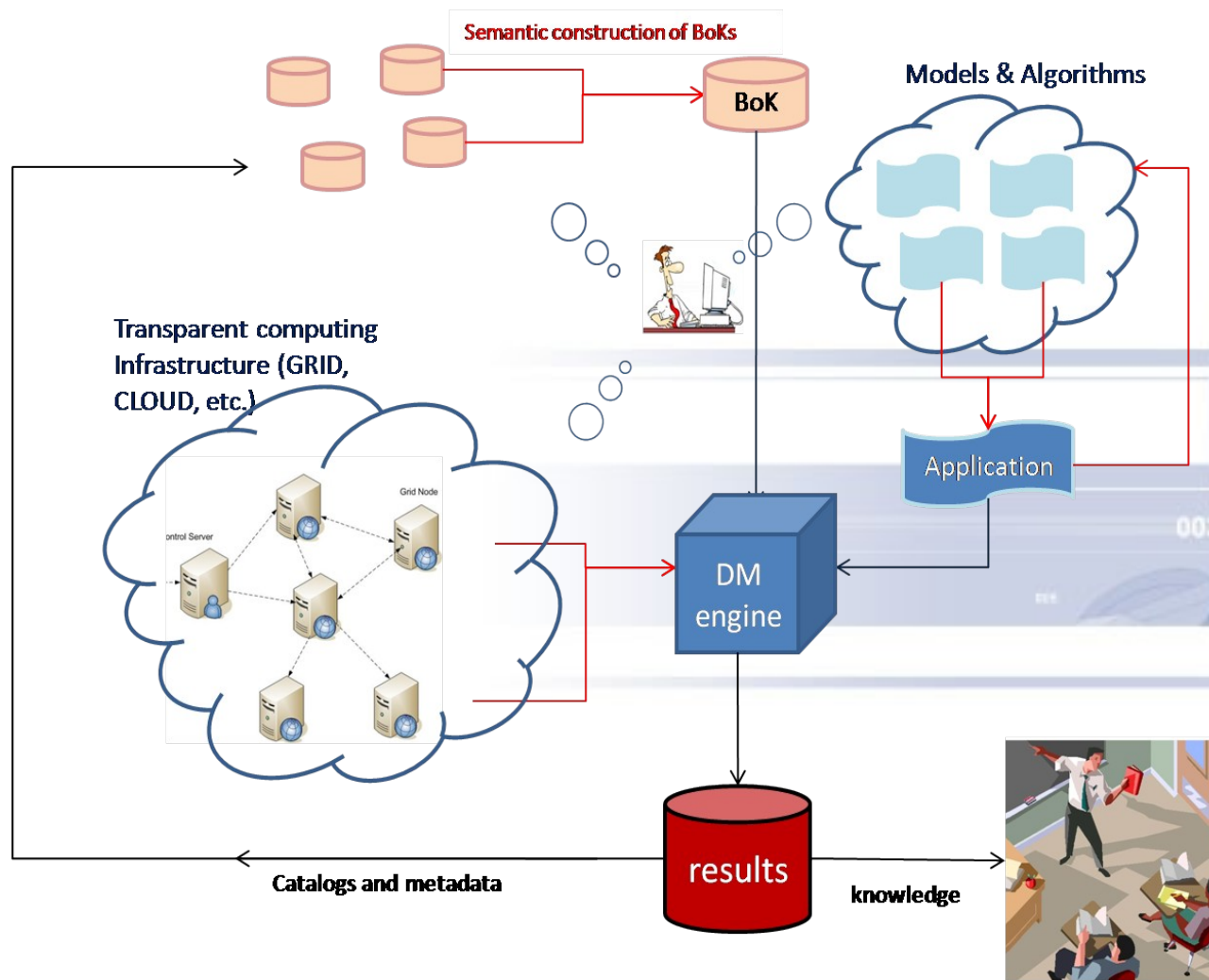
Il Progetto DAME (Data Mining & Exploration)



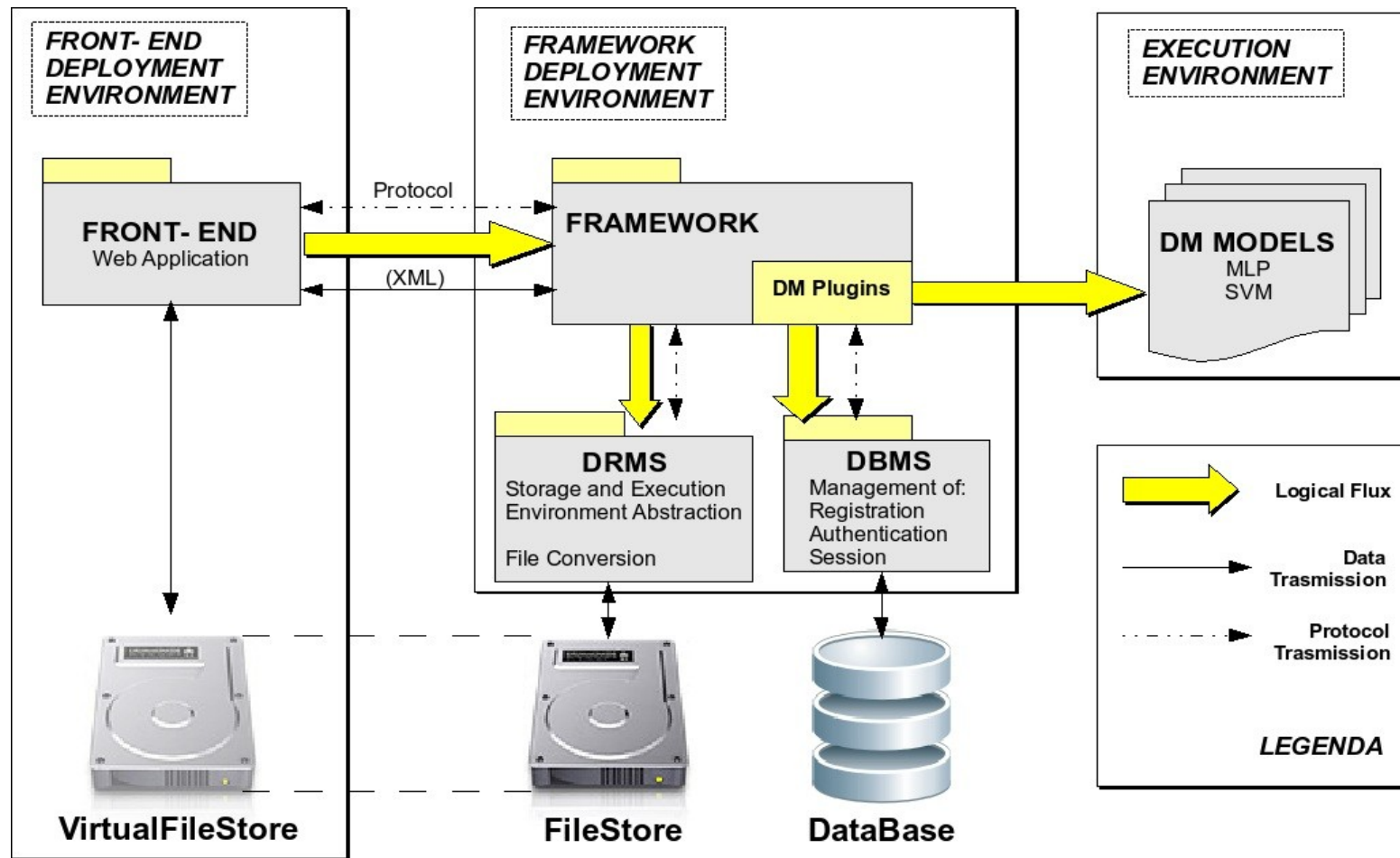
Sommario

- Integrazione in DAME di :
 - Clustering Multi-livello (MultiLayerClustering);
 - Modello Self Organizing Map (SOM) di tipo general purpose
 - Modello SOM per clustering specifico per la segmentazione di immagini astronomiche

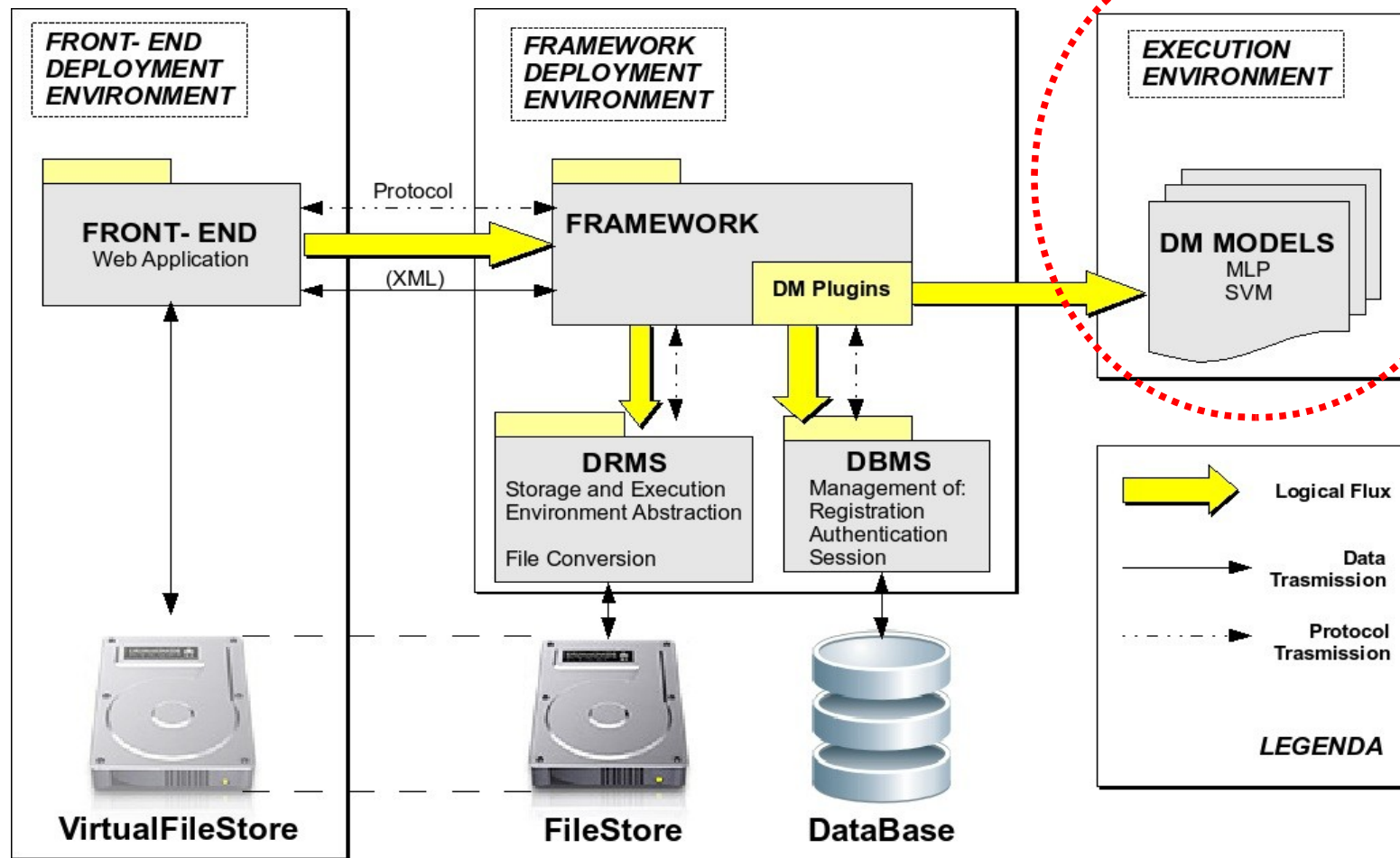
Il Progetto DAME: concetto chiave



Il Progetto DAME:architettura della suite



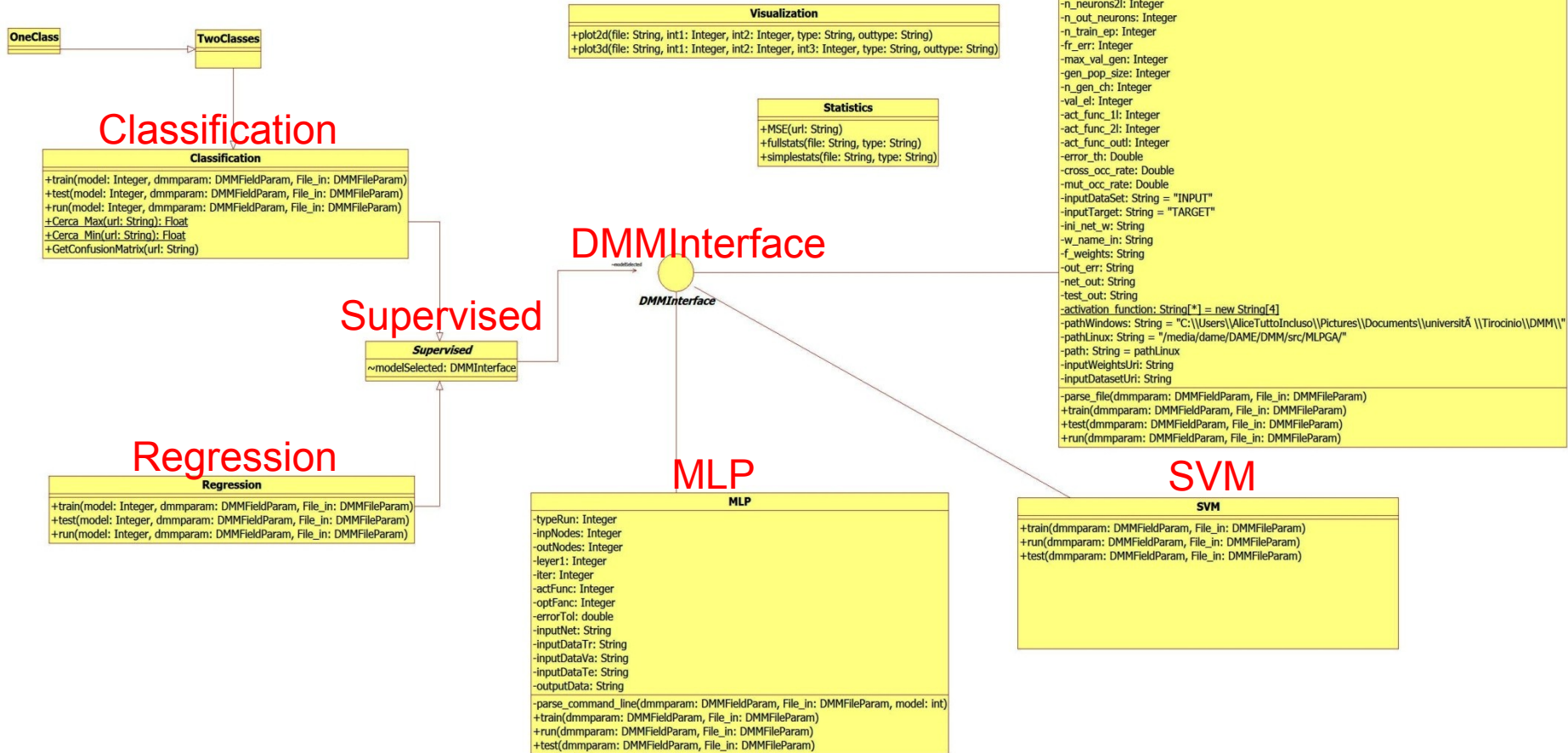
Il Progetto DAME:architettura della suite



Il Progetto DAME: il componente DMM



Le origini

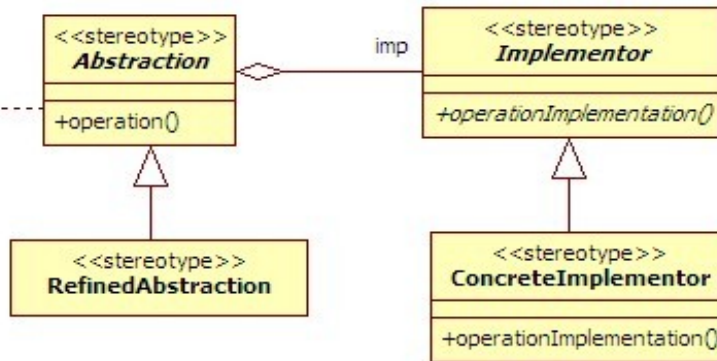


Il Progetto DAME:integrazione del DMM

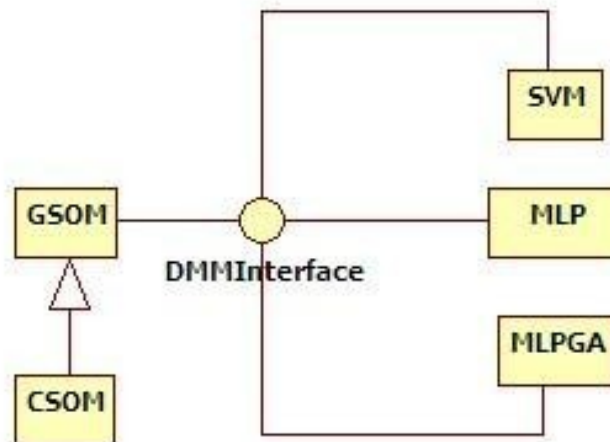


```
operation{
  imp.operationImplementation();
}
```

Bridge Pattern



Livello di Implementazione



```

GSOM
-typeRun: Integer
-typeNet: Integer
-numberLayers: Integer
-epochsNumber: Integer
-inputNetUri: String
-initVar: double[]
-finalVar: double[]
-initLearnRate: double[]
-finLearnRate: double[]
-numNeurons: Integer

+train(dmmparam: DMMFieldParam, File_In: DMMFileParam)
+run(dmmparam: DMMFieldParam, File_In: DMMFileParam)
+test(dmmparam: DMMFieldParam, File_In: DMMFileParam)
-parse_line(dmmparam: DMMFieldParam, File_In: DMMFileParam)
    
```

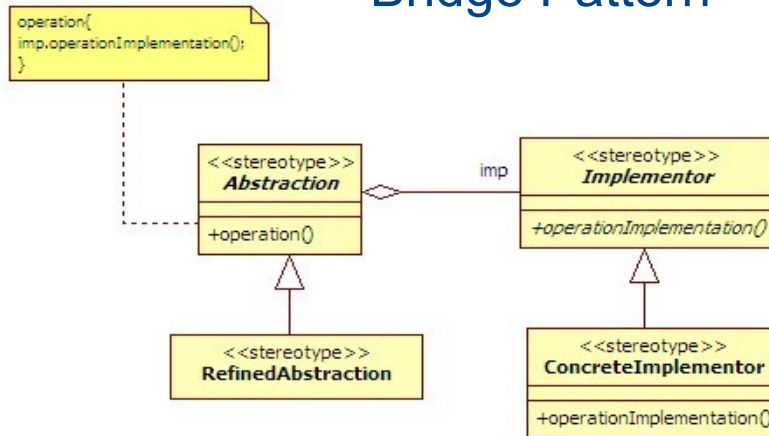
```

CSOM
-typeRun: Integer
-typeNet: Integer
-numberLayers: Integer
-epochsNumber: Integer
-inputNetUri: String
-initVar: double[]
-finalVar: double[]
-initLearnRate: double[]
-finLearnRate: double[]
-numNeurons: Integer

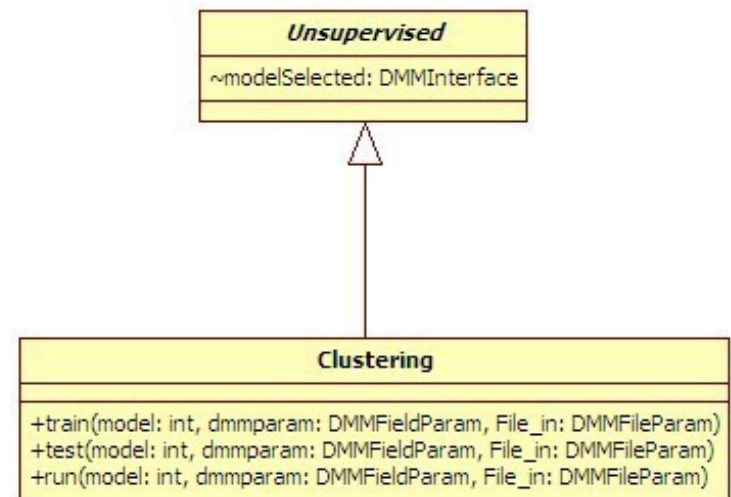
+train(dmmparam: DMMFieldParam, File_In: DMMFileParam)
+run(dmmparam: DMMFieldParam, File_In: DMMFileParam)
+test(dmmparam: DMMFieldParam, File_In: DMMFileParam)
-parse_line(dmmparam: DMMFieldParam, File_In: DMMFileParam)
    
```



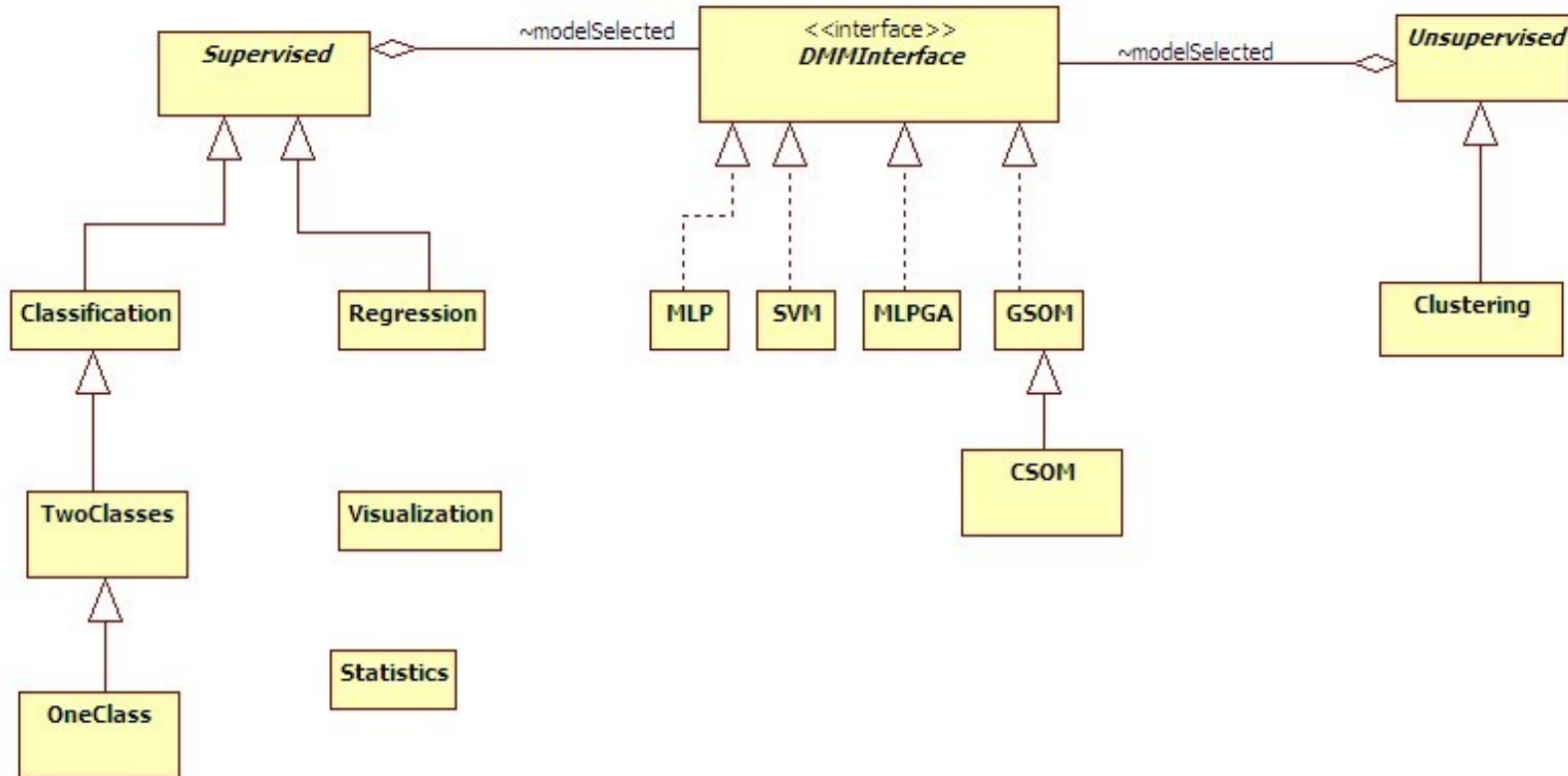
Bridge Pattern



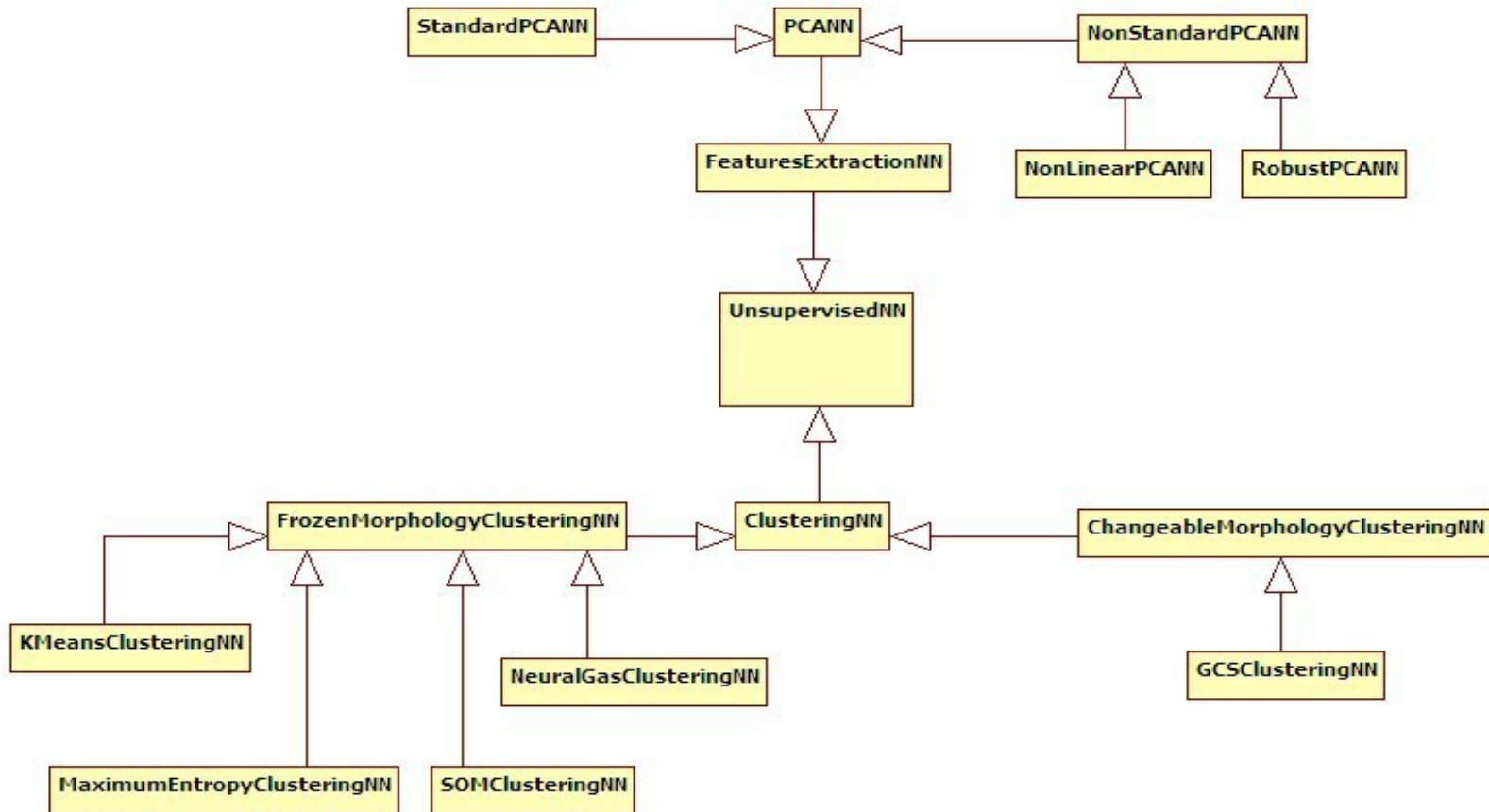
Livello di Astrazione



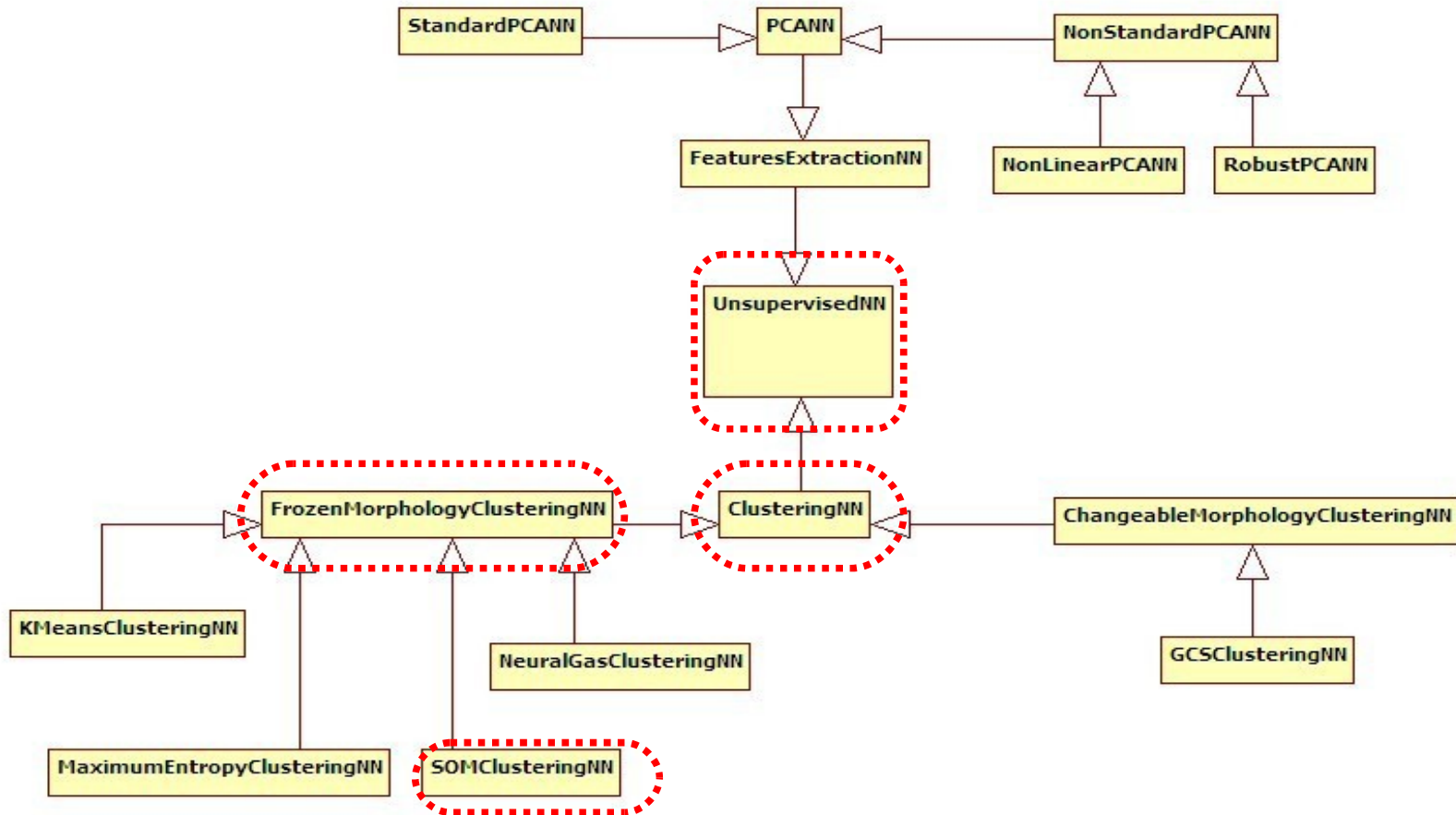
DMM Integrato



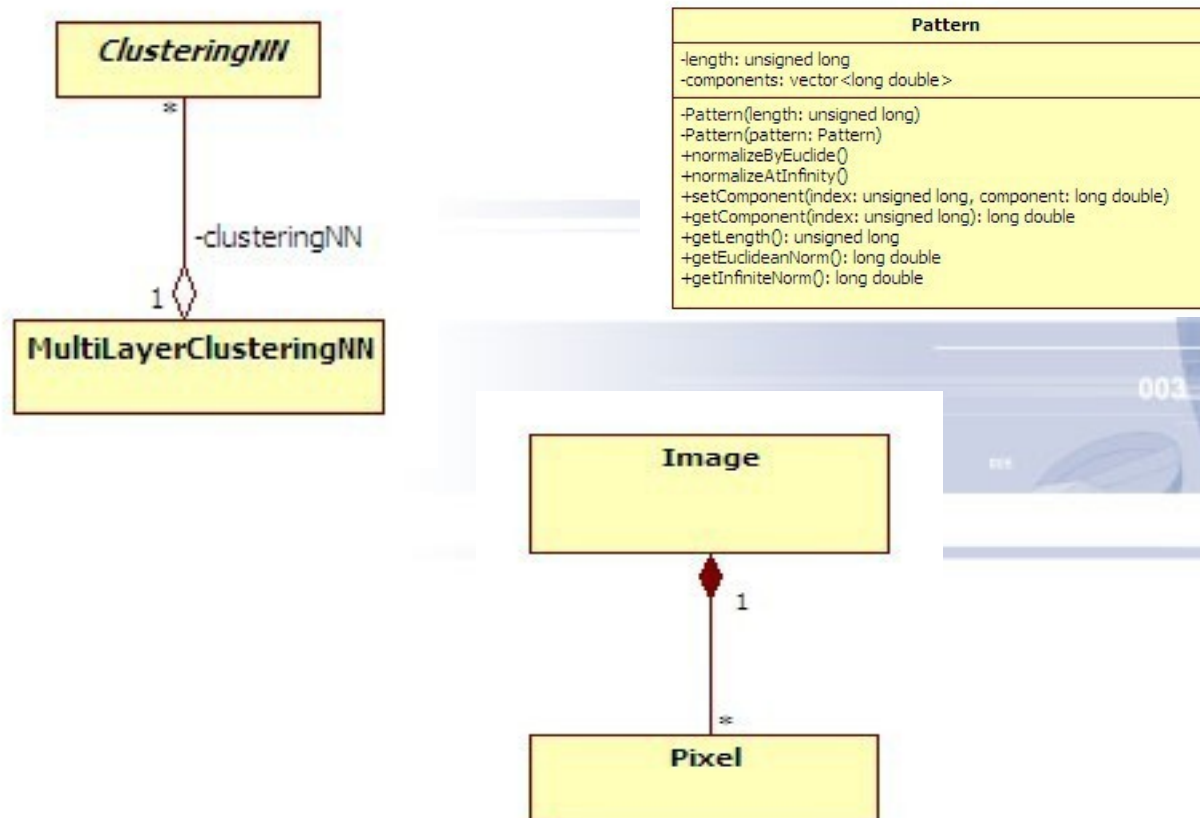
La struttura della libreria NEXTII



La struttura della libreria NEXTII



La struttura della libreria NEXTII





Integrazione nella libreria NExTII di metodi specifici per il trattamento di formati di dati secondo i requisiti dell'infrastruttura DAME

ImageTable
-rowsNumber: unsigned long -columnsNumber: unsigned long -bandsNumber: unsigned long -pixels: vector<Pixel> -tags: vector<string>
+ImageTable() +ImageTable(rowsNumber: unsigned long, columnsNumber: unsigned long, bandsNumber: unsigned long) +ImageTable(imageTable: ImageTable) +readFromFitsTable(tableFitsFileName: string): void +readFromDatTable(tableFileName: string): void +readFromCSVTable(tableFileName: string): void +writeOnFitsTable(tableFitsFileName: string): void +writeOnDatTable(tableFileName: string): void +writeOnCSVTable(tableFitsFileName: string): void +raiseBrightness(): void +setPixel(row: unsigned long, column: unsigned long, pixel: Pixel): void +getPixel(row: unsigned long, column: unsigned long): Pixel +getRowsNumber(): unsigned long +getColumnsNumber(): unsigned long +getBandsNumber(): unsigned long

NExTII:

- FITS standard
- estensione di tipo IMAGE.

DAME:

- FITS standard
- FITS con estensione ASCII_TABLE
- ASCII
- CSV



Il controllo della libreria NEXTII

NextControl
-bandsNumber: unsigned long -neighborhoodDiameter: unsigned long -patternLength: unsigned long -multiLayerClusteringNV: MultiLayerClusteringNV -cluster: vector<unsigned> -multiLayerClusteringNVConfigured: bool -extractingPixels: bool -readyForExtraction: bool -classifyingPixels: bool -needTrainingMultiLayerClusteringNV: bool
+NextControl() +NextControl() +configureMultiLayer(numberLayers: unsigned long, numCluster: unsigned long, initLearnRate: long double, finalLearnRate: long double, learnEpochsNumber: unsigned long, initialVariance: long double, finalVariance: long double) +getBandsNumber(): unsigned long +getNeighborhoodDiameter(): unsigned long +getPatternLength(): unsigned long +setBandsNumber(bandsNumber: unsigned long) +setNeighborhoodDiameter(neighborhoodDiameter: unsigned long) +setPatternLength(patternLength: unsigned long) +extractPattern(imageD: Image, rows: unsigned long, columnsNumber: unsigned long): Pattern +extractPattern(tableD: ImageTable, rows: unsigned long, columnsNumber: unsigned long): Pattern +extractTrainingPattern(imageD: Image, rowsNumber: unsigned long, columnsNumber: unsigned long): vector<Pattern> +extractTrainingPattern(tableD: ImageTable, rowsNumber: unsigned long, columnsNumber: unsigned long): vector<Pattern> +trainMultiLayer(imageD: Image, traceFile: string) +trainMultiLayer(tableD: ImageTable, traceFile: string) +clusterMultiLayer(imageD: Image, clusterFile: string) +clusterMultiLayer(tableD: ImageTable, clusterFile: string) +searchPatternReference(st2: fstream, index: unsigned long): string +saveAdvancedTrainResult(tableDat1: ImageTable, tableDat2: ImageTable, fileOutName: string) +saveTrainingResults(fileResult: string, netFile: string) +isWaitingConfiguration(): bool +isConfiguring(): bool +isClusteringPixels(): bool +isReadyForExtraction(): bool +isClassifyingPixels(): bool

➤ Configurazione del clustering

multi-livello;

➤ Estrazione dei pattern

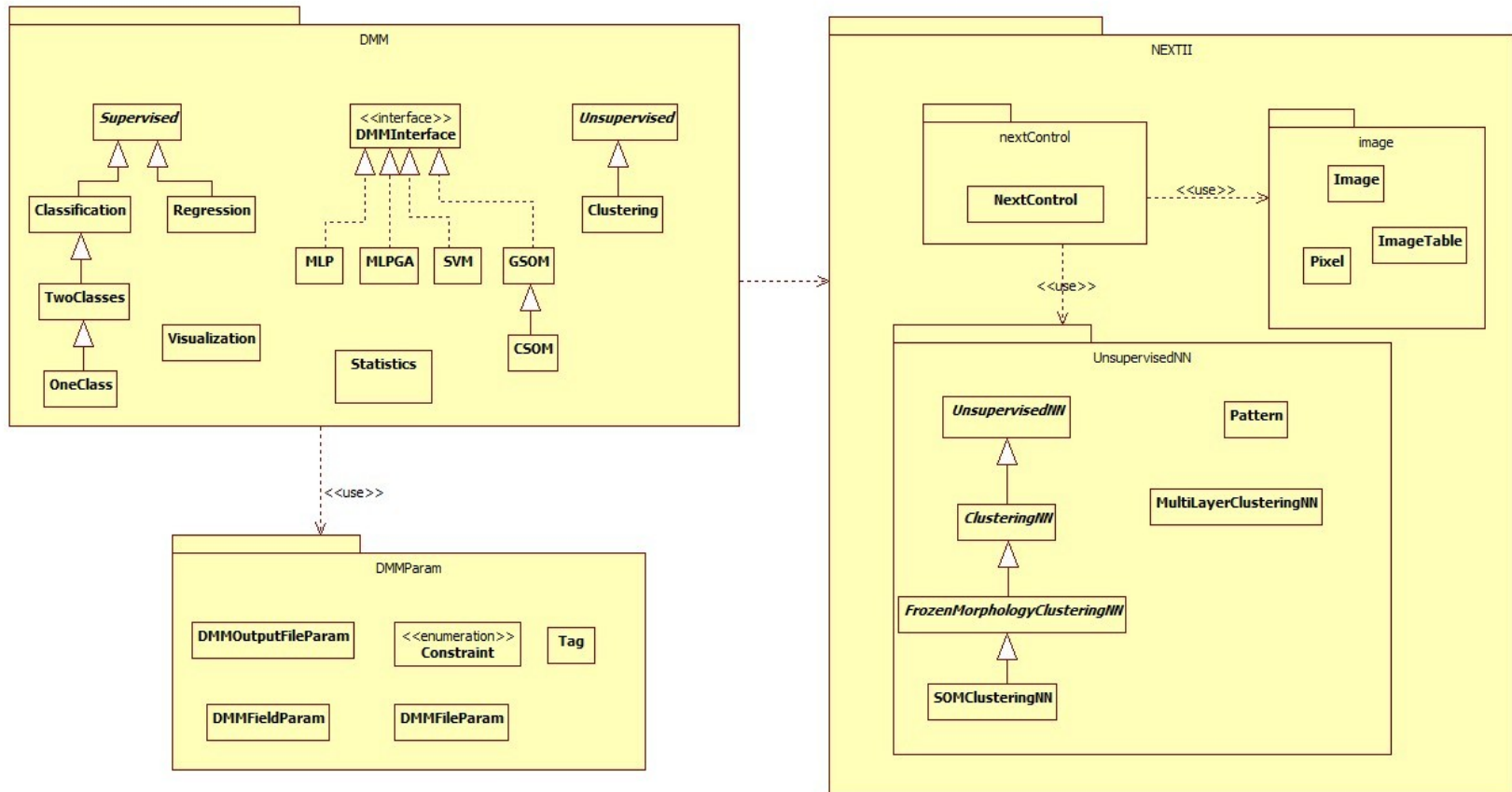
➤ Addestramento

➤ Clustering

Il Progetto DAME e la libreria NEXTII



La comunicazione tra DAME e NEXTII





I DMPLugin

Plugin Informations	
Name	<input type="text"/>
Documentation	<input type="text"/>
Version	<input type="text"/>
Domains	<input type="text"/>

Owner Informations	
Owner Name	<input type="text"/>
Owner Mail	<input type="text"/>

Running Modes Informations		
Train	<input type="checkbox"/>	Documentation <input type="text"/>
		Running Time <input type="text" value="0"/>
Test	<input type="checkbox"/>	Documentation <input type="text"/>
		Running Time <input type="text" value="0"/>
Run	<input type="checkbox"/>	Documentation <input type="text"/>
		Running Time <input type="text" value="0"/>
Full	<input type="checkbox"/>	Documentation <input type="text"/>
		Running Time <input type="text" value="0"/>

Components

Caratteristiche dei plugin:

- Estensione dei modelli
- Interfaccia java dedicata
- Configurazione dei parametri di I/O riguardanti il modello utilizzato

Genera automaticamente codice per istanziare un modello associato ad una funzionalità.

Per il Clustering due plugin:

- CSOM_Clustering;
- GSOM_Clustering;

Il Progetto DAME: Beta Release



http://voneural.na.infn.it/beta_info.html

DAME Application

App Manuals | Model Manuals | Cloud Services | Science Cases | Documents | Info

Logout : [User Icon]

RESOURCE MANAGER

Workspace

Workspace	Upload	Experimen	Rename	Delete
New Workspace				
Workspace				
k				
d				
tr				

File Manager

Dow	Edit	File	Type	Last Access	Dele
No items to show.					

My Experiments

Experiment	Status	Last Access	Delete
No items to show.			



- Integrazione dei nuovi plugin all'interno della prossima release della suite

DAME

- Integrazione di tutti i modelli del workflow NExTII

**Grazie
Per la cortese
Attenzione**

