Project Proposal

(*Instructions: this proposal will appear on the PhD webpage https://cqb.dieti.unina.it/ and will be forwarded to specialized sites. Please give a synthetic background and two to four research objectives. Include some information about the expected background of the candidate and relevant references. Please fill the part regarding the funding source/grants of the research activity needed for equipment, reagents, travels, conferences, traineeships etc.*)

Multi-Omics Genes and Molecules Network Embedding (MIMNE)

Project Description (*max 500 words*)

The aim of this project is to define and build an integrated system (MIMNE) based on the application of graph embedding techniques on gene multi-omics and molecules networks representing cancer gene-gene interaction, drug molecules interactions and drug-gene interactions.

The MIMNE system will be equipped with machine learning functions that will implement:

- The prediction of determinant genes to be used as a potential drug target.
- The prediction of novel gene-gene, gene-drug or drug-drug relationships.
- The prediction of crosstalk relationship between gene sets.
- The prediction of gene interactions for missing omics layers.

The proposed project will advance the state of the art in the modelling of complex biological systems by providing:

- A methodology that can compactly represent information of hundreds of thousands of molecular features and relationships.
- The first method to able to capture and predict multi-omics relationships for gene sets and drug sets.
- A methodology to perform multi-omics community detection of genes and drugs sets.

The main outcome of this project will be a computational platform based on a set of MIMNEs covering all the TCGA cancers and all the drugs with known molecular targets along with their respective mechanism of action.

Supervisor(s), Lab/Group details, other additional info. (*please provide information about the group and available facilities*)

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