Workshop Projects

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Suggested Projects

Prediction & Evaluation

Comparing Ontotype to DAISY workflow

Eytan Ruppin et al used 3 statistical methods on different biological data to predict SL (Synthetic Lethal) interactions.

This project will reconstruct:

- DAISY workflow
- Ontotype model

And will compare the results of both methods to an unused test set

Comparing Ontotype to Mashup

Bonnie Berger et al generated features for each gene using PPI (Protein Protein Interactions) network, and merged these for each pair of genes.

This project will reconstruct:

- Mashup model for genetic interactions
- Ontotype model

And will compare the results of both methods to an unused test set

Augment Ontotype

This project will reconstruct the Ontotype model, and will improve the model's results.

This can be done in any technique, including:

- New feature generation
- Feature selection / Dimensionality reduction
- Change in algorithm (from Random forest to GBM, SVM, Deep learning...)

Suggested Projects

Application

Predict SL in Human

This project will attempt to use the general Ontotype model to predict SL interactions on humans. We will require a significant change in AUC.

Two possible routes are:

- Train and test on human data
  - Note that there is a relatively small amount of data, so this may not be feasible
- Train on yeast, use trained classifier as an input to train on human

Predict Side Effects using Ontotype

This project will attempt to predict side effects created by drugs using the Ontotype model.

- Examine drugs with known gene targets and side effects on specific organs (tissues)
- Simulate the drug action in different tissues using Ontotype and predict side effects

Predict essentiality in cell lines

Wang et al measure gene essentiality on different cell lines. We want to use the Ontotype method to predict the same essentiality.

- Mimic the cell line by removing the mutated genes
- Input the genes into an Ontotype based model for prediction
- Compare the results with those in the paper

Predict cell lines to drug sensitivity

Benes et al map cell lines to drug sensitivity. We attempt to identify the sensitivity using the Ontotype model.

- Mimic the cell lines by removing the mutated genes
- Add the drug gene targets as mutated genes
- Predict drug sensitivity using the mutated data
- Compare the results with those in the paper

Predict treatment survival

This project will attempt to predict survival rates of different cancer treatments using the Ontotype model.

- Mimic cancer treatments by removing the relevant genes
- Predict survival rate using an Ontotype based model