**1st Updated Project Plan (brief version)**

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Course: BB2899 Project in Molecular Science

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| Early stage | Week 36 (Sept. 3rd) – Week 39 (Sept 30th) | 1) Literature review  2) Demonstrate the **research purpose** and final goal: To identify novel application for a specific existing drug to treat the different disease by exploring the drug mode of action with System Biology algorithm as well as Flux Balance analysis and genome-scale metabolic modeling, processing on the DrugMatrix database  3) Study and understand the **datasets** used: DrugMatrix which contains gene expression microarray data along with histopathology, chemistry analysis tested by 600 drugs with various dose levels in vivo and in vitro using male Sprague Dawley rats  ~~4) Pre-select and further confirm the~~ **~~research subject~~**~~: heart tissue is used and a specific drug~~  5) Obtain the preprocessed Affymetrix array and Codelink data, including background correction, normalization and summarization with Python and R (2 weeks)  \* Before retrieval the data, summarize and select the common drugs on tissues otherwise create redundancy of unnecessary drugs |
| Middle stage | Week 40 (Oct 1st) – Week 44 (Nov 4th) | 1) Construct the analysis pipeline (2 weeks)  2) Explore the drug mode of action on the selected tissue through e.g. differential expression, gene set enrichment with specific comparisons / controls (time points / dose levels) (1 week)  3) Explore the drug mode of action on all the tissues and drugs (1 week)  ~~4) Analyze, summarize the results and generate standard visualization plots~~  ~~5) After creating the standard pipeline, extend this procedure to all drugs on all selected tissues~~  ~~5) Pick one specific drug from the results obtained using the pipeline for further modeling~~  5) Prepare for the half time presentation (5 days)  6) Start to write the report outline, e.g. introduction, methods, results section (5 days)  7) Update the project plan |
| Later Stage | Week 45 (Nov 5th) – Week 49 (Dec 9th) | 1) Construct network to explore the reaction / pathways to identify the key regions / subnetwork, e.g. co-expression network generation, canonical pathways analysis, drug-association metrics (1 week)  2) Study the metabolic characteristics with genome-scale metabolic models and Flux Balance Analysis to infer the biological meaning of specific drug / drugs mode of action (1 week)  ~~3) Validate the repurposing inference?~~  4) Update project plan  5) Write the final report  6) Do data supplement |
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