Relationships between nucleosome positioning and gene expression in plant

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Plant, environment, & transcription

Intro


Transcriptional regulation

• An overview

Staring out

• Can we predict transcription using cis-elements?

Prediction scheme

• Basic idea

Thanks to...

• Lab members

• Collaborators

Intro

Prediction with putative cis-elements

- Performance of predictions

At 40% recall, precision is:
- 95%, very good
- 45%, ok
- 10%, not good

Response to 150mM NaCl at 3hr

Why are we not perfect?

- Because some important features missing?
- Because the data does not have sufficient resolution?
- Because the data quality is not good enough?

Considering chromatin accessibility

- Nucleosome occupancy

Nucleosome occupancy

Nucleosome DNA
Naked DNA

Nucleosome occupancy & expression

- Correlation with expression levels

What motifs tend not to be occupied

- Comparing observed & background

6-mers & DNase I hypersensitivity

- As expected, occupancy & DHS are highly correlated

DHS data from:
Zhang et al., 2012 Plant Cell
**6-mer occupancy & locations**

- Occupancy appears position independent

Rice data from: Wu et al., 2014 PLoS Genet

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**Phasing & expression prediction**

- Expect Type I > II > III > random

When 50% predictions are correct, 20% negatives are falsely called positive.

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**Nucleosome occupancy & treatment**

- Chromatin state does not change as much as we thought before and after treatment

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**Summary**

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https://sparklelimer/foodwordpress.com/2012/02/pic1.jpg