Using daily inpatient Serum Creatinine to predict Chronic Kidney Disease in children

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Background
- Pediatric patients with abnormal renal function during hospitalization are at risk of developing chronic kidney disease (CKD) months later.
- LPCH nephrologists do not have capacity to provide follow-up renal monitoring and care to all at-risk patients, and it is unknown which are at greatest risk.

Objective
Using data available at time of discharge, can we predict the development of CKD 3-12 months later?

Data
- Data on 4,179 patients were pulled and processed

Model Development
Developed 3 models:
- Used subset of data with >2 SCr labs to predict outcome using the last 3 labs from the stay
- Used subset of data with >3 SCr labs to predict outcome using the last 3 labs
- Used subset of data with >3 SCr labs to predict outcome using the last 4 labs

Results
- Inpatient lab values are predictive of developing chronic kidney disease after hospitalization
- Using the last 3 labs, I achieved a Dev AUC of 0.7866, which is clinically useful.
- Adding a fourth lab value increased the training AUC but did not improve the dev AUC, suggesting overfitting. Regularization may improve performance with four lab values.

Future Work
- I plan to develop more complex models and compare performance to my baseline models. Specifically:
  - LSTM recurrent neural network that can handle variable length lab value vectors
  - Hybrid model that uses an encoding from an LSTM recurrent neural network together with fixed-length inputs (age, height, weight, etc.) as features for fully connected model

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References
- Authors, date, etc.

Planned Implementation
- Diagram with steps for implementation and analysis

Architecture of hybrid model planned for future work:
- Diagram showing architecture

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