KAGGLE COMPETITION

IMAGE2BIOMASS PREDICTION

WHAT ?

Goal

- Build models that predict pasture biomass from images and ground-truth measurements

WHY ?

Motivation

Help farmers to
- better estimate the amount of feed available
- track pasture health more accurately

WHO ?

Team

Anneli Oro
Robert Koor

Project D6

Learn more about this project

HOW ?

Our approach

- Robert: EfficientNet CNN on images + MLP for tabular features
- Anneli: LGBM with KFold on images + tabular features
- Final: Used KFold with CNN + MLP

Results & Conclusions

- Sucessfully designed, built and trained a model that predicted biomass components based on imput images
  - it wasn't a very good model :(
- Understanding & training neural networks is difficult but it was a good opportunity to try something completely different

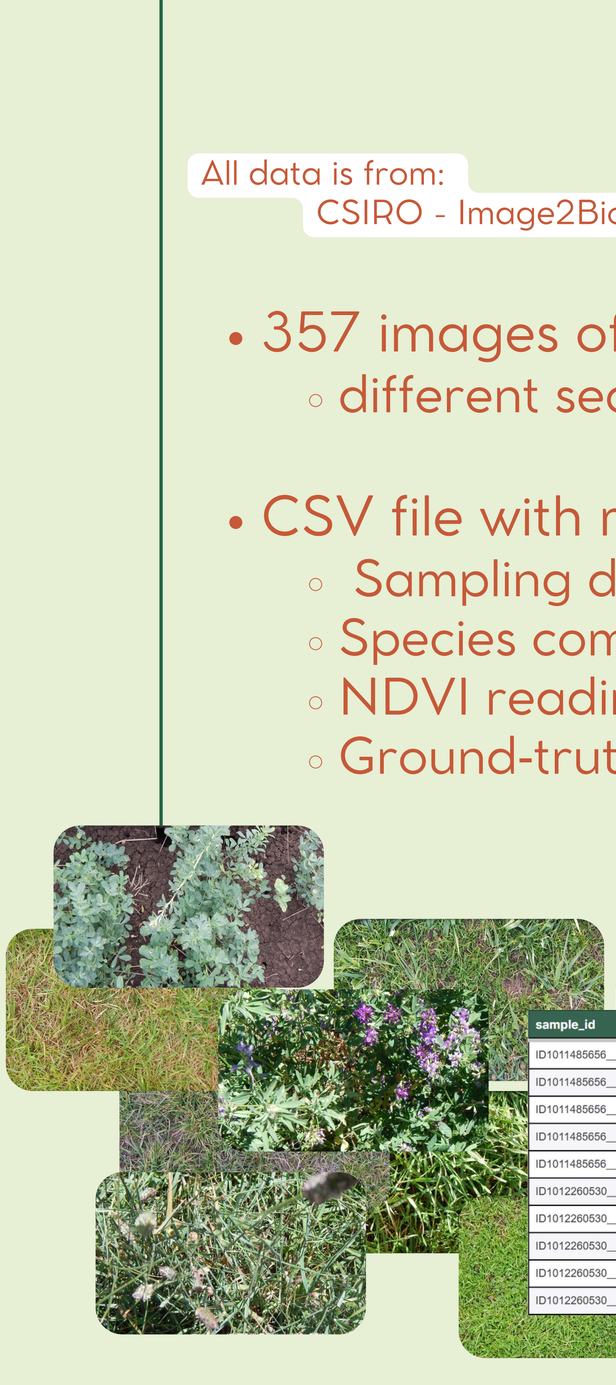
Data

All data is from:
CSIRO - Image2Biomass Prediction Kaggle competition

- 357 images of Australian pastures
  - different seasons, regions, species
- CSV file with metadata
  - Sampling date & state of origin
  - Species composition
  - NDVI readings & average height
  - Ground-truth biomass components

Data science methods

- Data: pivoting, merging, cyclical encoding, scaling, one-hot encoding
- Images: resize, flip, rotate, color jitter, normalize
- Model: CNN + MLP fusion, multi-output regression, masked loss
- Training: GroupKFold CV, early stopping, LR scheduling, gradient clipping
- Metrics: weighted R^2, masked MSE
- Inference: fold averaging, clipping, CSV export



sample_id	image_path	Sampling_Date	State	Species	Pre_GSHH_NDVI	Height_Ave_cm	target_name	target
ID1011485656__Dry_Clover_g	train/ID1011485656.jpg	2015/9/4	Tas	Ryegrass_Clover	0.62	4.6667	Dry_Clover_g	0
ID1011485656__Dry_Dead_g	train/ID1011485656.jpg	2015/9/4	Tas	Ryegrass_Clover	0.62	4.6667	Dry_Dead_g	31.9984
ID1011485656__Dry_Green_g	train/ID1011485656.jpg	2015/9/4	Tas	Ryegrass_Clover	0.62	4.6667	Dry_Green_g	16.2751
ID1011485656__Dry_Total_g	train/ID1011485656.jpg	2015/9/4	Tas	Ryegrass_Clover	0.62	4.6667	Dry_Total_g	48.2735
ID1011485656__GDM_g	train/ID1011485656.jpg	2015/9/4	Tas	Ryegrass_Clover	0.62	4.6667	GDM_g	16.275
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ID1012260530__Dry_Dead_g	train/ID1012260530.jpg	2015/4/1	NSW	Lucerne	0.55	16	Dry_Dead_g	0
ID1012260530__Dry_Green_g	train/ID1012260530.jpg	2015/4/1	NSW	Lucerne	0.55	16	Dry_Green_g	7.6
ID1012260530__Dry_Total_g	train/ID1012260530.jpg	2015/4/1	NSW	Lucerne	0.55	16	Dry_Total_g	7.6
ID1012260530__GDM_g	train/ID1012260530.jpg	2015/4/1	NSW	Lucerne	0.55	16	GDM_g	7.6