Assessing Stem Cell Therapeutics in Murine Models: Progress Presentation 1

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Introduction

Sue and Bill Gross Stem Cell Research Center @ UCI School of Medicine

- Spinal Cord Injury
- Ladder Beam
- Catwalk

Primary Objectives:

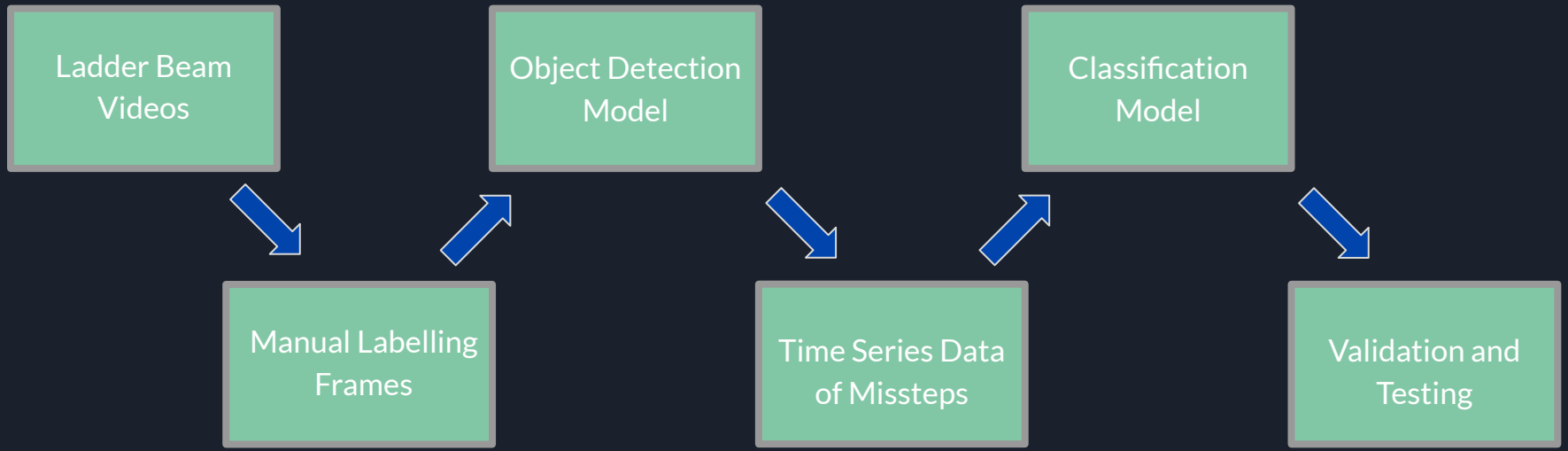
- Evaluate effectiveness of treatments for SCI
- Classifying (tracking) mice steps

Data Source:

- Ladder Beam Videos
- Summary Excel Sheets

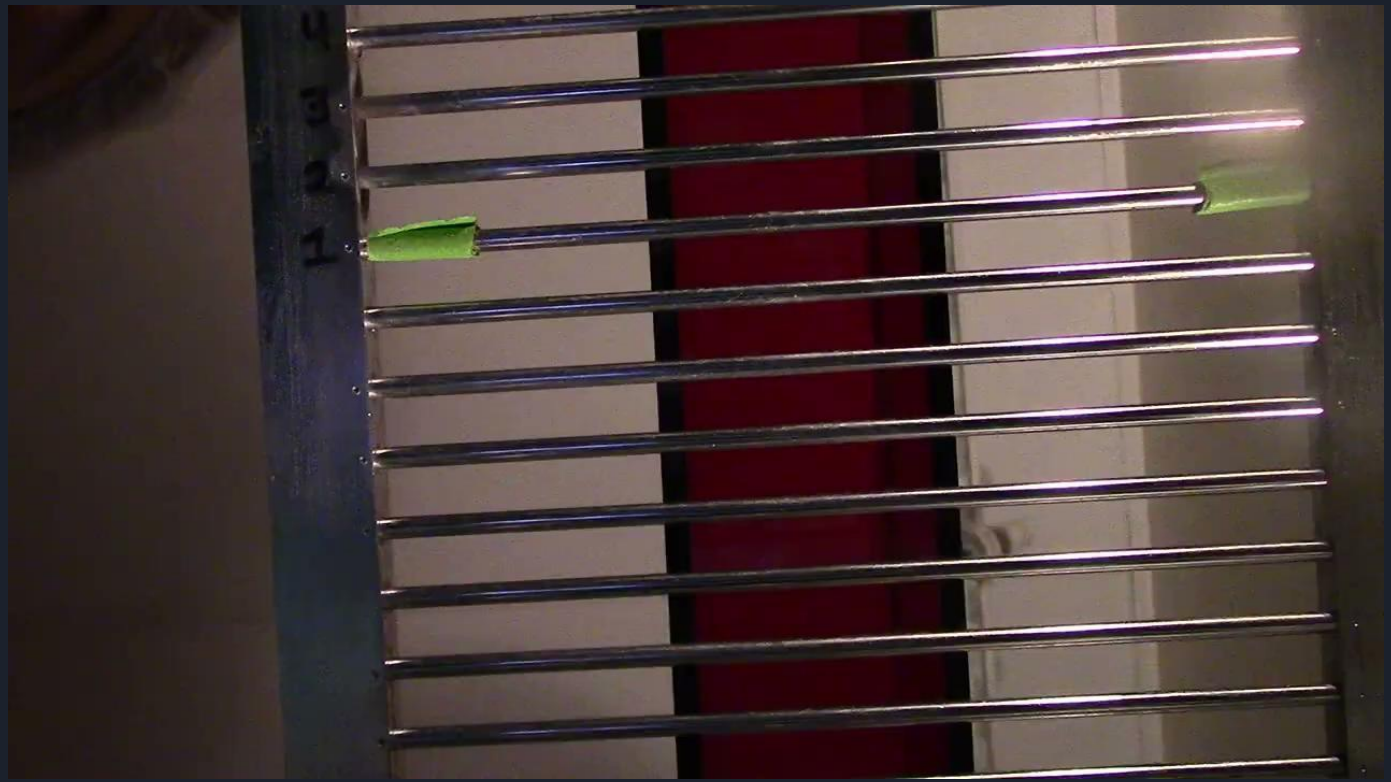
UCI School of Medicine

Data Pipeline



Raw Data: Individual Mice and Ladder Beam Clip

	Run 1	
P	45	47
M	5	3
	Right	Left



		Right	Left	
Pink	50	P	P	50
	49	P	M	49
	48	P	P	48
	47	P	P	47
	46	P	P	46
	45	P	P	45
	44	M	P	44
	43	P	M	43
	42	P	P	42
	41	P	P	41
Blue	40	P	P	40
	39	P	P	39
	38	P	P	38
	37	P	P	37
	36	P	P	36
	35	P	P	35
	34	P	P	34
	33	P	P	33
	32	P	P	32
	31	P	P	31
Yellow	30	P	P	30
	29	M	P	29
	28	P	P	28
	27	M	P	27
	26	P	P	26
	25	M	P	25
	24	P	P	24
	23	P	P	23
	22	P	P	22
	21	P	P	21
Orange	20	P	P	20
	19	P	P	19
	18	M	M	18
	17	P	P	17
	16	P	P	16
	15	P	P	15
	14	P	P	14
	13	P	P	13
	12	P	P	12
	11	P	P	11
Red	10	P	P	10
	9	P	P	9
	8	P	P	8
	7	P	P	7
	6	P	P	6
	5	P	P	5
	4	P	P	4
	3	P	P	3
	2	P	P	2
Green	1	P	P	1
		Right	Left	

Raw Data: Summary Data

Project	A111.1
Analyzer	
Day Post Injury	

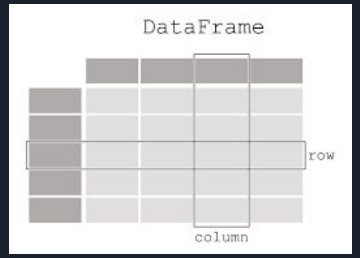
Cumulative Error
Same as Total Bad (L+R, 3 runs)

For Sided Injuries

Animal	Total Good (L+R, 3 runs)	Total Bad (L + R, 3 runs)	Ave Good	Ave Bad	LB Score	CE	Ave L Good	Ave R Good	Ave L Bad	Ave R Bad
1	276.0	24.0	46.0	4.0	92.0	24.0	46.0	46.0	4.0	4.0
2	280.0	20.0	46.7	3.3	93.3	20.0	48.0	45.3	2.0	4.7
3	255.0	45.0	42.5	7.5	85.0	45.0	40.0	45.0	10.0	5.0
4	228.0	71.0	38.0	11.8	76.3	71.0	37.0	39.0	13.0	10.7
5	267.0	33.0	44.5	5.5	89.0	33.0	45.0	44.0	5.0	6.0
6	279.0	21.0	46.5	3.5	93.0	21.0	45.7	47.3	4.3	2.7
7	276.0	24.0	46.0	4.0	92.0	24.0	46.7	45.3	3.3	4.7
8	226.0	74.0	37.7	12.3	75.3	74.0	38.3	37.0	11.7	13.0
9	227.0	73.0	37.8	12.2	75.7	73.0	39.7	36.0	10.3	14.0
10(11)	222.0	78.0	37.0	13.0	74.0	78.0	36.7	37.3	13.3	12.7
10*(10)	252.0	48.0	42.0	8.0	84.0	48.0	42.0	42.0	8.0	8.0
12	247.0	53.0	41.2	8.8	82.3	53.0	38.7	43.7	11.3	6.3
14	251.0	49.0	41.8	8.2	83.7	49.0	42.0	41.7	8.0	8.3
15	277.0	23.0	46.2	3.8	92.3	23.0	43.3	49.0	6.7	1.0
16	275.0	25.0	45.8	4.2	91.7	25.0	43.0	48.7	7.0	1.3
17	217.0	83.0	36.2	13.8	72.3	83.0	37.7	34.7	12.3	15.3
18	271.0	29.0	45.2	4.8	90.3	29.0	45.7	44.7	4.3	5.3
19	285.0	15.0	47.5	2.5	95.0	15.0	46.3	48.7	3.7	1.3
21	253.0	47.0	42.2	7.8	84.3	47.0	36.3	48.0	13.7	2.0
22	283.0	17.0	47.16666667	2.8	94.3	17	49.0	45.3	1.0	4.7
23	255.0	45.0	42.5	7.5	85.0	45	40.7	44.3	9.3	5.7
24	273.0	27.0	45.5	4.5	91.0	27	45.3	45.7	4.7	4.3
25	281.0	19.0	46.83333333	3.2	93.7	19	45.3	48.3	4.7	1.7
26	219.0	81.0	36.5	13.5	73.0	81	38.0	35.0	12.0	15.0
27	291.0	9.0	48.5	1.5	97.0	9	49.3	47.7	0.7	2.3
28	248.0	52.0	41.33333333	8.7	82.7	52	41.3	41.3	8.7	8.7
29	237.0	61.0	39.5	10.2	79.5	61	41.7	37.3	7.7	12.7
30	263.0	36.0	43.83333333	6.0	88.0	36	41.7	46.0	8.0	4.0
31	263.0	37.0	43.83333333	6.2	87.7	37	44.3	43.3	5.7	6.7
32	232.0	68.0	38.66666667	11.3	77.3	68	35.7	41.7	14.3	8.3

Variable	Description
Animal ID (int)	The mouse's unique ID number
Type (factor)	The group the mice belongs to (Wild, CD44 Knock-out, Vehicle)
Avg Good (double)	Average number of good steps (plantar steps) across the mouse's three runs
Avg Bad (double)	Average number of bad steps (missteps) across the mouse's three runs

Data Cleaning



Summary Sheet

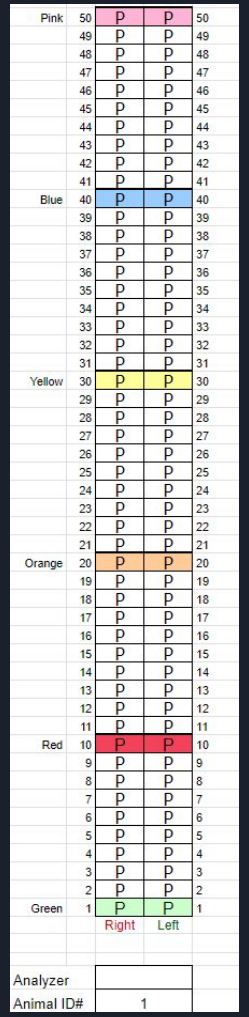
- Extracting necessary columns

Individual Mice Sheets

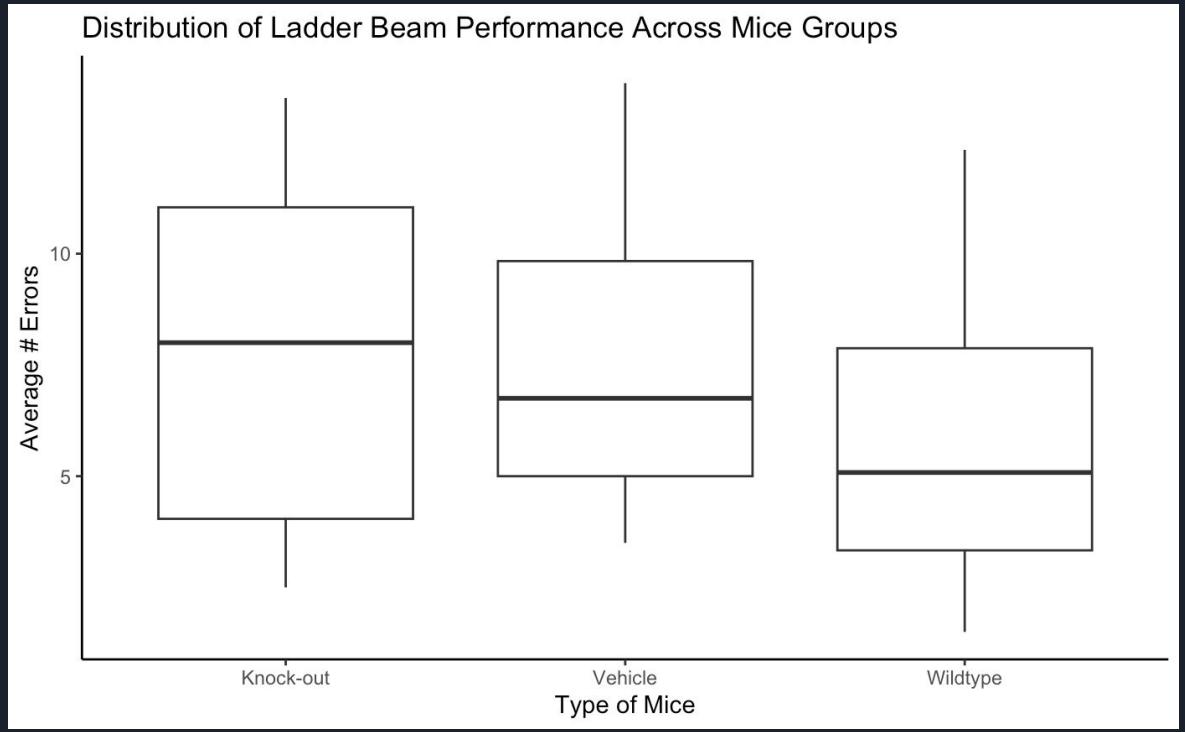
- Combining misstep information from each mouse

Video Data

- Manually labeling ladder rungs and mouse paws

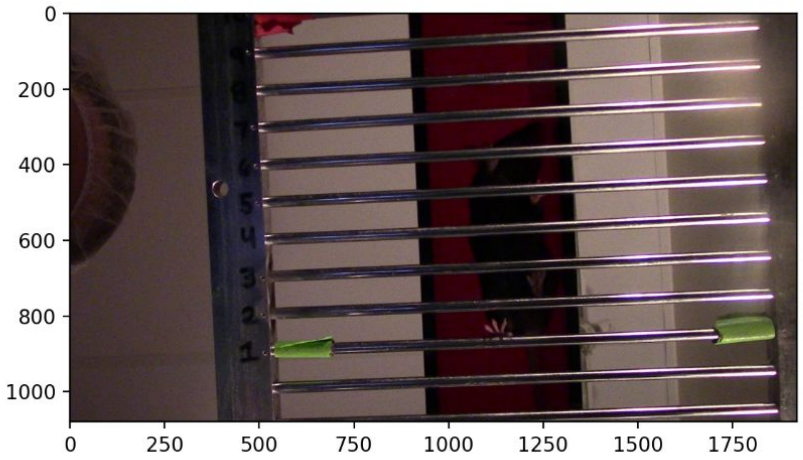


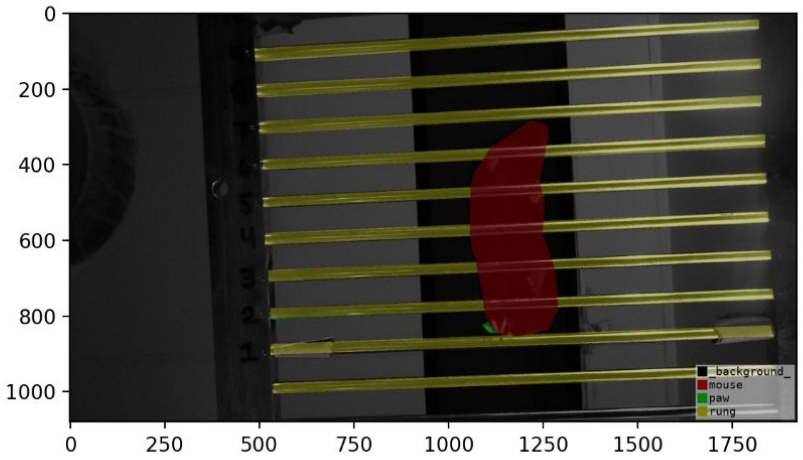
Mice Performance By Groups



Example of Labeled Frame

LabelMe Tool





Next Steps

Completing: Data wrangling and exploratory data analysis

Next: Begin Model Development

- Finish labelling
- Initial Object Tracking Model
- ANOVA
- Tukey’s T-test
- Pairwise T-tests

Milestones

Winter:

Weeks 8 to 10

Finalize project goal and data wrangling

Spring:

Weeks 1 to 2

Exploratory Data Analysis

Weeks 3 to 4

Initial Model Development

Weeks 5 to 6

Incorporating ML Algorithms

Weeks 7 to 8

Model Evaluation and Testing

Weeks 9 to 10

Project write-up and presentation