

Assessing Stem Cell Therapeutics in Murine Models: Progress Presentation 2

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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:

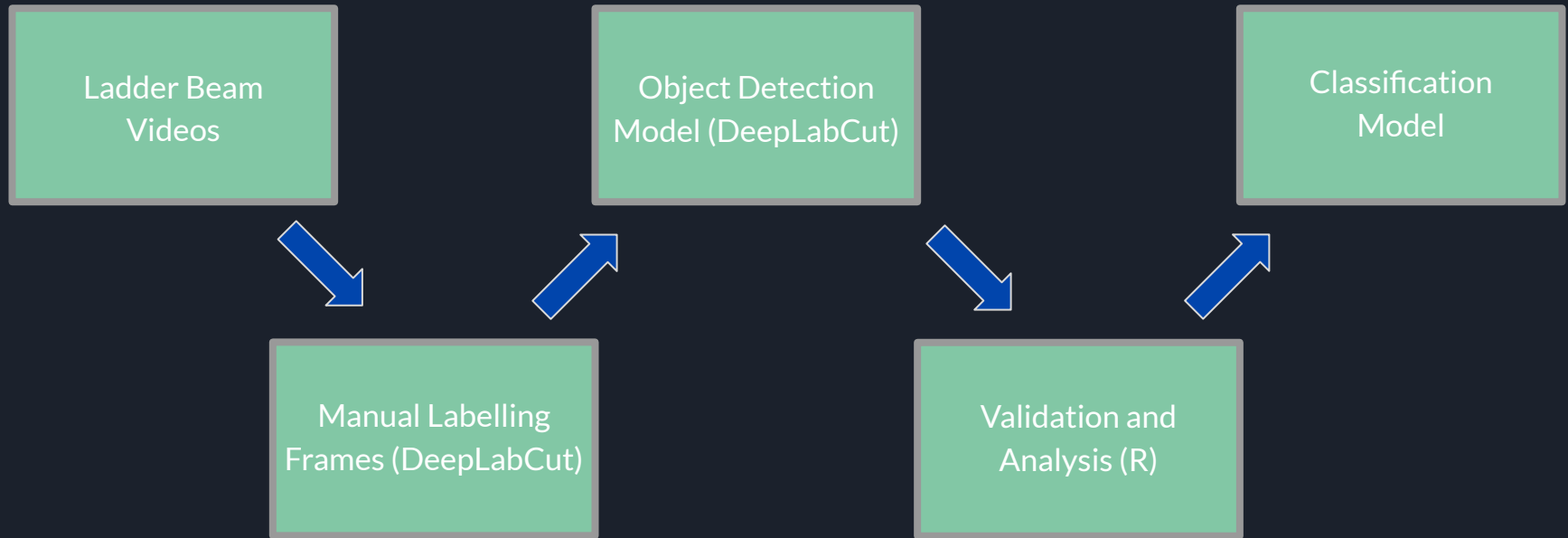
- Evaluate effectiveness of treatments for SCI
- Classifying (tracking) mice steps

Data Source:

- Ladder Beam Videos
- Summary Excel Sheets



Data Pipeline



Raw Data: New Ladder Beam Clips



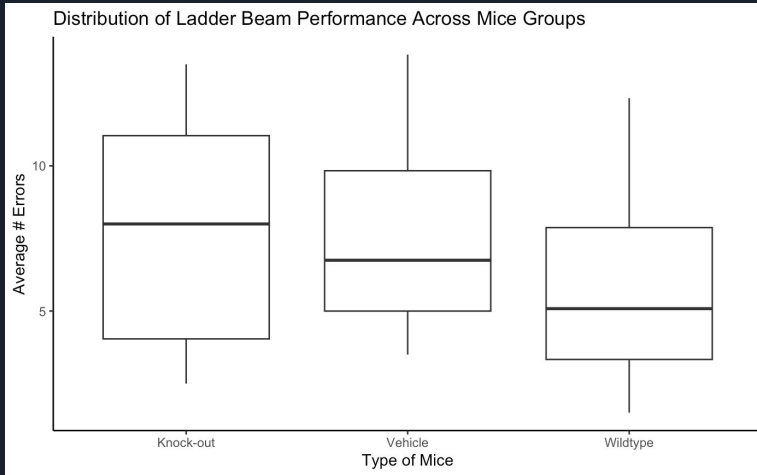
Summary Sheet Data

Animal ID	Total Good Steps	Total Bad Steps	Average Good Steps	Average Bad Steps	LB Score	Type
1	276	24	46.00	4.00	92.00	w
2	280	20	46.67	3.33	93.33	k
3	255	45	42.50	7.50	85.00	w
4	228	71	38.00	11.83	76.25	k
5	267	33	44.50	5.50	89.00	v
6	279	21	46.50	3.50	93.00	v
7	276	24	46.00	4.00	92.00	k
8	226	74	37.67	12.33	75.33	w
9	227	73	37.83	12.17	75.67	k
10	222	78	37.00	13.00	74.00	v

Training Data

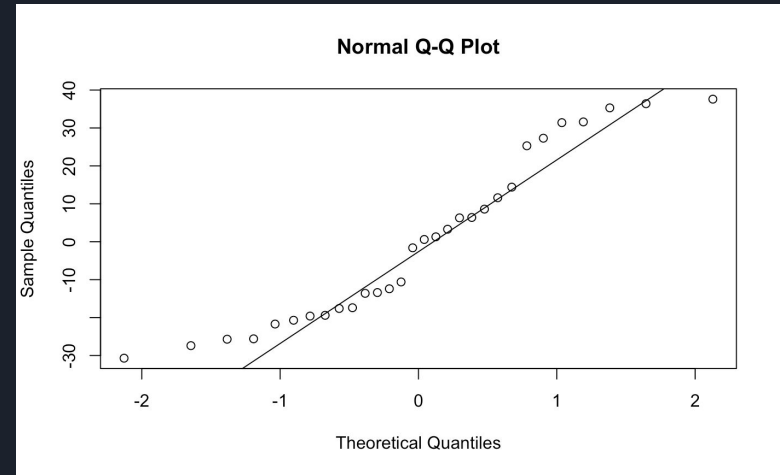
video	frame	bodypart	x	y
MVI_8324	img0234.png	front_left_paw	1058.571	673.246
MVI_8324	img0234.png	front_right_paw	1137.828	613.803
MVI_8324	img0234.png	back_left_paw	1124.619	1023.298
MVI_8324	img0234.png	back_right_paw	1223.690	917.622
MVI_8324	img0272.png	front_left_paw	1160.945	564.268
MVI_8324	img0272.png	front_right_paw	1250.109	491.616
MVI_8324	img0272.png	back_left_paw	1141.131	874.691
MVI_8324	img0272.png	back_right_paw	1243.504	973.762
MVI_8324	img0392.png	front_left_paw	1124.619	399.149
MVI_8324	img0392.png	front_right_paw	1243.504	488.313

ANOVA Model



Test Results:

- Average number of errors is not significantly different among the three types of mice after treatment (p-value = 0.543)



Diagnostics

- Normality
- Constant Variance
- Independence

CNN Model

DeepLabCut:

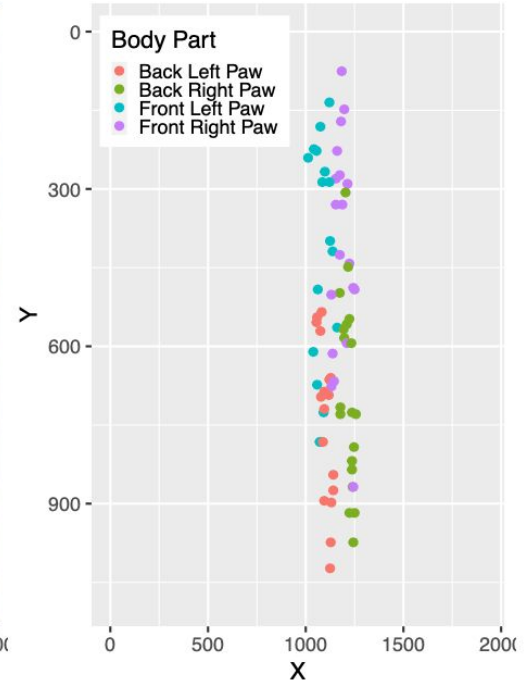
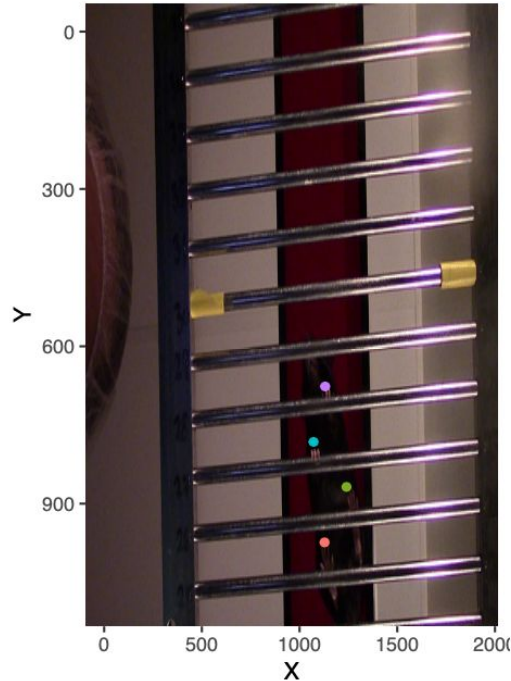
Made for Pose Estimation

Label Frames of Videos

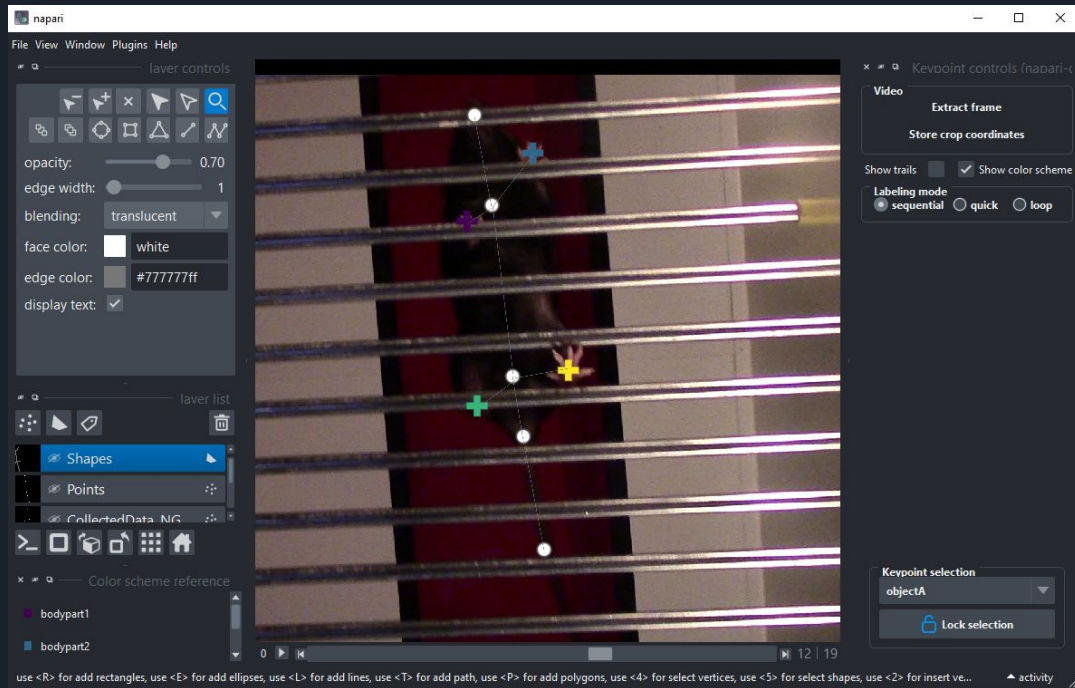
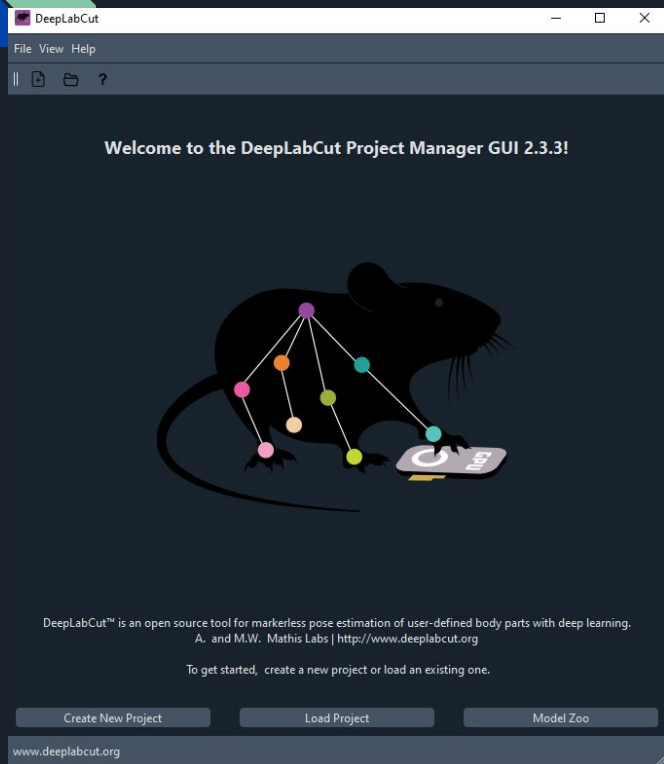
Train Neural Network

Roadblock: computing power

Solution: RCIC



DeepLabCut

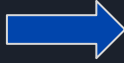


Milestones and Next Steps

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 9 to 10

Project write-up
and presentation



Weeks 7 to 8

Model Evaluation
and Testing



Weeks 5 to 6

Incorporating ML
Algorithms





Questions?