



UNIVERSITY OF
CALGARY

Department of Geomatics Engineering

Geomatics engineering and disc golf

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SaGES @ BCIT



- Plate check calibration
- Acoustic observations: echo sounder
- “Mechanical” observations: graduated rope/chain
- Check observations: sounding lead
- Repeat at set intervals (e.g., 0.5 m or 1 m)

- Indirect/parametric functional model:

$$\ell = f(x, c)$$

- Functional model:

$$d_{mech} = S \cdot d_{echo} + T$$

where

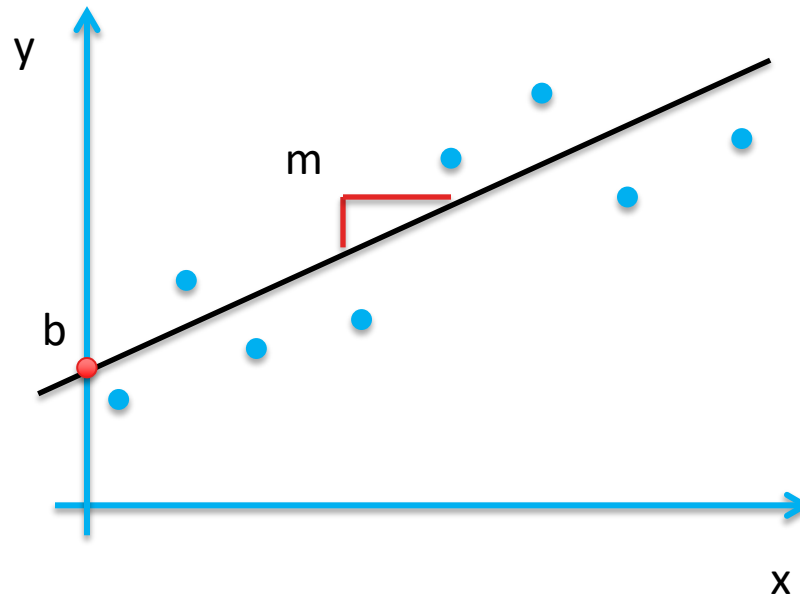
- T is a vertical offset (or draft) and
- S is effectively the scale factor for the speed of sound in water

$$d_{corr} = S \cdot d_{err} + T$$

$$d_{mech/corr} = S \cdot d_{echo/err} + T$$



$$y = m \cdot x + b$$









Foothills Camp and Retreat Centre Main

HOLE	1	2	3	4	5	6	7	8	9	Tot
DIST	77	42	66	114	69	53	49	55	53	
PAR	3	3	3	3	3	3	3	3	3	
Ee-vahn De...	3	3	2	3	4	3	2	2	4	26 -1

Jun 8, 13:57, Bowden, AB, Canada
 24 °C ⇌ 2 m/s SSW



- The Professional Disc Golf Association (PDGA) sanctions leagues and tournaments

▼ MA3 - Mixed Amateur 3 (9)

[Hide round ratings](#) | [View hole scores](#)

Place	Points	Name	PDGA#	Rating	Par	Rd1	Total
1	27.00	John Smith	270399	848	E	56	927

- PDGA provides players with round ratings

Tournament	Tier	Date	Division	Round	Score	Rating	Evaluated	Included
Get Rated - Thorncliffe	C	9-May-2025	MA3	1	56	927	Yes	Yes

- It is the custodian of registered players' cumulative ratings

Effective Date	Rating	Rounds Used
13-May-2025	861	25



- Incomplete or incorrect signage / app display
- Misleading topology
- Lack of topographic information
- Grossly incorrect distances to target
- Scoring app monopoly
- Ratings algorithm is a black box

- Use a parametric least squares adjustment where
 - Round scores (or pars) are treated as constants
 - Prior ratings of propagator players are the observations
 - The unknown parameters are the slope and intercept of the best fit line through the data

$$(player\ rating) = slope \cdot (par) + intercept$$

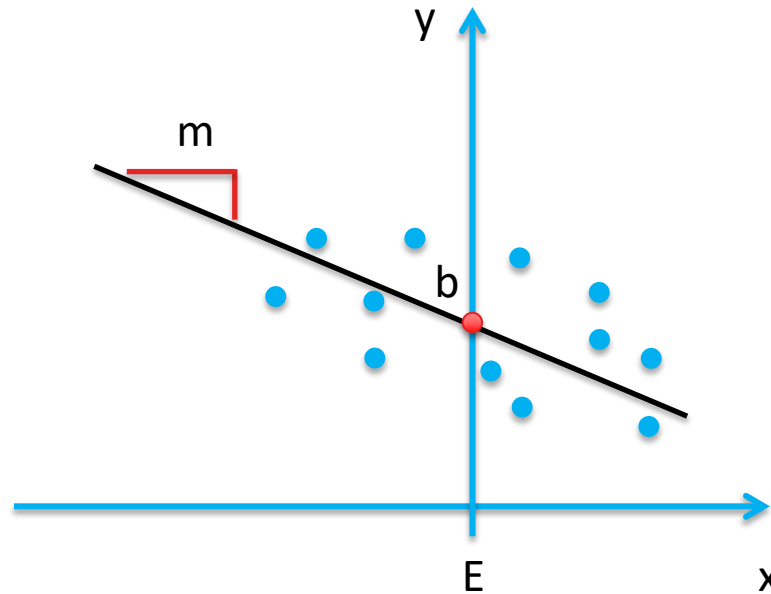
where

- Intercept is the rating for scoring even
- Slope is effectively the number of rating points for each throw

(player rating) = slope · (par) + intercept



$$y = m \cdot x + b$$



- Least squares is hard but can be fun
- Functional models should ideally be rigorous and must be applied correctly
- Having physical meaning behind the parameters helps
- Plots / graphs showing the geometric representation can be useful visual aids
- Estimating disc golf ratings can be an introductory example for a linear least squares adjustment
- More least squares in 2027... 😊

?

(player rating) = slope · (score) + intercept



$$y = m \cdot x + b$$

