

The effect of limb position on myoelectric prosthetic control using linear regression

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► Myoelectric prosthetics

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- ▶ Myoelectric prosthetics
- ▶ Variations in limb positions lower accuracy [1]

[1] Fougner et al. IEEE TNSRE (2011)

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- ▶ Myoelectric prosthetics
- ▶ Variations in limb positions lower accuracy [1]
- ▶ Classification [1] vs regression [2]

[1] Fougner et al. IEEE TNSRE (2011)

[2] Hahne et al. IEEE TNSRE (2014)

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- ▶ Myoelectric prosthetics
- ▶ Variations in limb positions lower accuracy [1]
- ▶ Classification [1] vs regression [2]
- ▶ Test performance of linear regression- based control across different limb positions

[1] Fougner et al. IEEE TNSRE (2011)

[2] Hahne et al. IEEE TNSRE (2014)

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Wrist Movements

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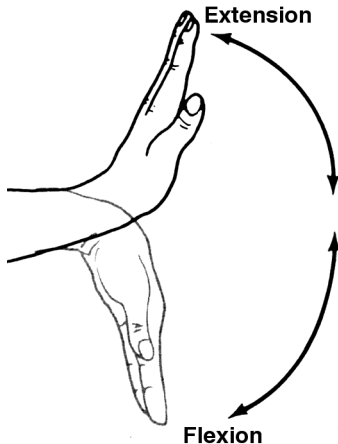
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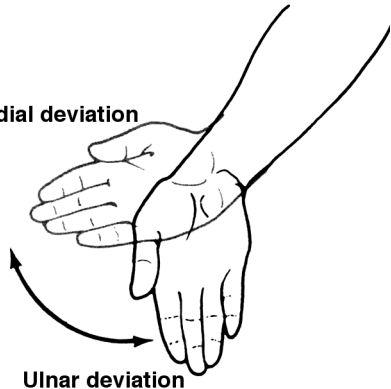
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Radial deviation



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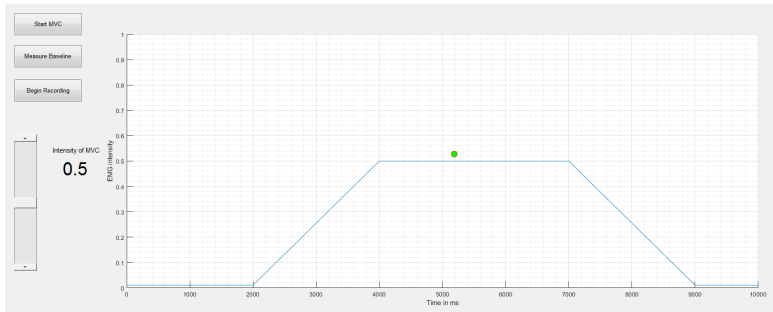
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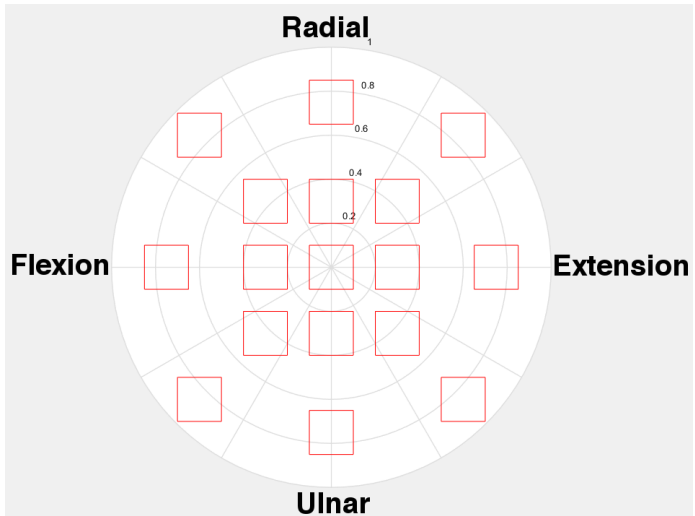
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Offline Results: training data

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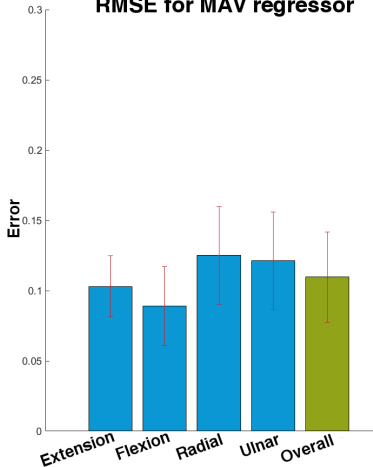
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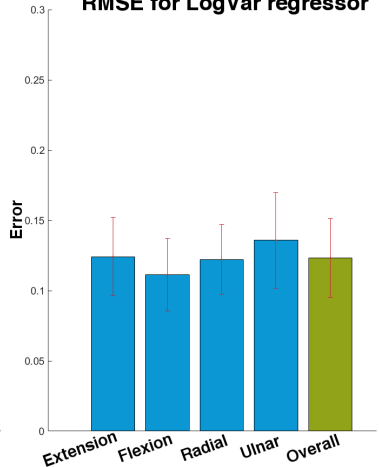
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RMSE for MAV regressor



RMSE for LogVar regressor



Significant difference between MAV and LogVar ($p = 0.0007$)

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Offline Results: test data

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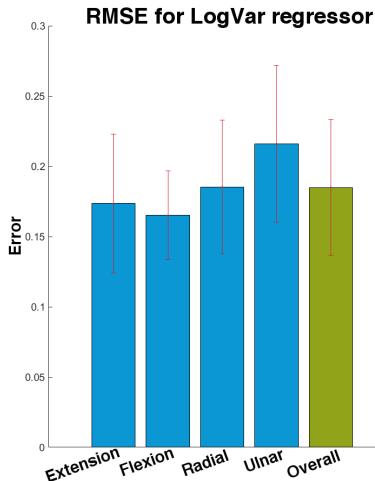
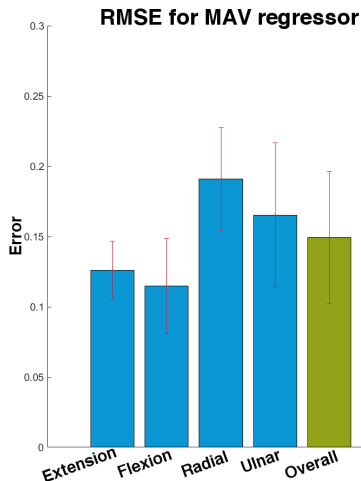
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Significant difference between MAV and LogVar ($p = 0.00082$)

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Offline Results: training VS test

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- ▶ Significant difference between MAV training and MAV test data ($p = 0.0002$)
- ▶ Significant difference between LogVar training and LogVar test data ($p = 0.0002$)

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Online Results: MAV

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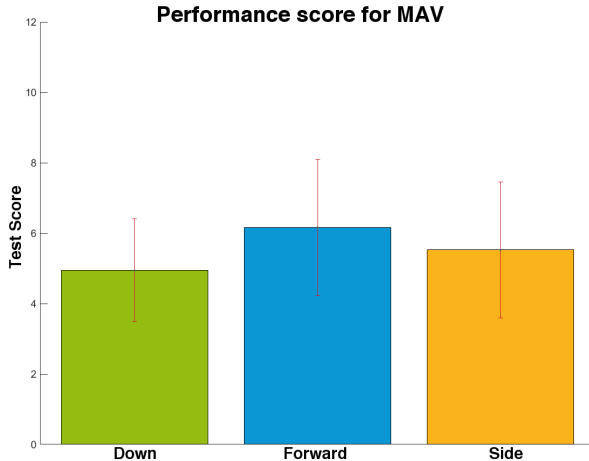
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No significant difference between limb positions ($p = 0.16$)

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Online Results: LogVar

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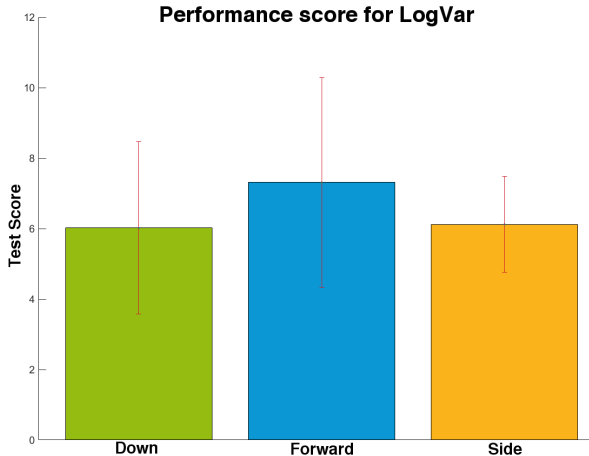
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No significant difference between limb positions ($p = 0.56$)

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Online Results: feature comparison

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- No significant difference between MAV and LogVar ($p = 0.13$)

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- No significant difference in performance across limb positions

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- ▶ No significant difference in performance across limb positions
- ▶ No correlation between offline and online test

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- ▶ No significant difference in performance across limb positions
- ▶ No correlation between offline and online test
- ▶ No significant difference in performance between the MAV and LogVar feature

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- ▶ No significant difference in performance across limb positions
- ▶ No correlation between offline and online test
- ▶ No significant difference in performance between the MAV and LogVar feature
- ▶ Large potential in linear regression-based myoelectric prosthetic control

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Thank you



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