Assessing Exposure to Slip, Trip, and Fall Hazards by Predicting Confidence Interval for Abnormal Gait Patterns

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STF hazards in construction
- Risky movement: jumping / carrying
- Inattentive walking: phone / chatting
- Risky environment: Stairs / Slope / Debris / Iron-wire

Gait variability index
Waist-worn IMU data
- Acceleration - Angular velocity

3 gait features
- Time (s) - Distance(m) - Velocity(m/s)

Mahalanobis Distance (MD)
A single unit Gait Variability Index

Abnormal Gait Pattern Detection

Training Data
( MD without exposure )

Bi-LSTM
(normal pattern)

Evaluation / Validation
- Ave. 93.0% UAR for 16 workers: both with and without exposure
- 100% Acc. for inattentive walking: human factors

Generalizability and robustness to a practical application

CONCLUSION
- MONITOR: exposure to STF hazards
- IDENTIFY: high-risk workers to STFs
- PREVENT: STFs in a construction site

ACKNOWLEDGMENT
This study was financially supported by the NSF (#1800310) and the Liberty Mutual.