Capstone Proposal

Train a 3D avatar to walk

Guitard Alan

March 28, 2018

1 Domain Background

For a human, the ability to walk is one of the most basic knowledge he learnt during his childhood. Since we are trying with AI to, when we can't do better, mimic the ability of human being, the idea of teaching a robot to walk comes naturally in our mind.
One of the first attempt to do that was to develop an algorithm by trying to understand the physics formula of that movement. In 1993, Yamaguchi et al. [3] tried to make a little robot by trunk motion using the ZMP (Zero Moment Point) and the three axis (pitch, yaw and roll)[3]. In 1999, Nagasaka et al. added the OGM (Optimal Gradient Method) to that approach to "optimizes the horizontal motion of a trunk to reduce the deviation of the calculated ZMP from its reference." [2] and design the KHR-2 robot. The result was good but the gait of the robot wasnot very natural because it is very difficult to take all the factors in account for making the robot walk with a human gait.
[1]

2 Problem Statement

3 Datasets and Inputs

4 Solution Statement

5 Benchmark Model

6 Evaluation Metrics

7 Project Design

References

[1] Thomas Geijtenbeek, Michiel van de Panne, and A. Frank van der Stappen. Flexible muscle-based locomotion for bipedal creatures. *ACM Transactions on Graphics*, 32(6), 2013.

[2] Ken'ichiro Nagasaka, Hirochika Inoue, and Masayuki Inaba. Dynamic walking pattern generation for a humanoid robot based on optimal gradient method. *1999 IEEE International Conference*, 6:908 – 913 vol.6, 02 1999.

[3] J.-I Yamaguchi, Atsuo TAKANISHI, and Ichiro KATO. Development of a biped walking robot compensating for three-axis moment by trunk motion. *1993 IEEE/RSJ International Conference*, 11:561 – 566 vol.1, 08 1993.

Glossary

Zero Moment Point A definition. 1