Pig herd monitoring and undesirable tripping and stepping prevention - DTU Orbit
(17/12/2018)

Pig herd monitoring and undesirable tripping and stepping prevention

Humane handling and slaughter of livestock are of major concern in modern societies. Monitoring animal wellbeing in slaughterhouses is critical in preventing unnecessary stress and physical damage to livestock, which can also affect the meat quality. The goal of this study is to monitor pig herds at the slaughterhouse and identify undesirable events such as pigs tripping or stepping on each other. In this paper, we monitor pig behavior in color videos recorded during unloading from transportation trucks. We monitor the movement of a pig herd where the pigs enter and leave a surveyed area. The method is based on optical flow, which is not well explored for monitoring all types of animals, but is the method of choice for human crowd monitoring. We recommend using modified angular histograms to summarize the optical flow vectors. We show that the classification rate based on support vector machines is 93% of all frames. The sensitivity of the model is 93.5% with 90% specificity and 6.5% false alarm rate. The radial lens distortion and camera position required for convenient surveillance make the recordings highly distorted. Therefore, we also propose a new approach to correct lens and foreshortening distortions by using moving reference points. The method can be applied real-time during the actual unloading operations of pigs. In addition, we present a method for identification of the causes leading to undesirable events, which currently only runs off-line. The comparative analysis of three drivers, which performed the unloading of the pigs from the trucks in the available datasets, indicates that the drivers perform significantly differently. Driver 1 has 2.95 times higher odds to have pigs tripping and stepping on each other than the two others, and Driver 2 has 1.11 times higher odds than Driver 3. (C) 2015 Elsevier B.V. All rights reserved.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Statistics and Data Analysis, Danish Meat Research Institute
Contributors: Gronskyte, R., Clemmensen, L. K. H., Hviid, M. S., Kulahci, M.
Pages: 51-60
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Computers and Electronics in Agriculture
Volume: 119
Issue number: November
ISSN (Print): 0168-1699
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.27 SJR 0.814 SNIP 1.563
Web of Science (2017): Impact factor 2.427
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.27 SJR 0.873 SNIP 1.861
Web of Science (2016): Impact factor 2.201
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.99 SJR 0.816 SNIP 1.895
Web of Science (2015): Impact factor 1.892
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.71 SJR 0.961 SNIP 2.123
Web of Science (2014): Impact factor 1.761
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.89 SJR 0.95 SNIP 2.345
Web of Science (2013): Impact factor 1.486
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.86 SJR 1.053 SNIP 2.136
Web of Science (2012): Impact factor 1.766