Pig herd monitoring and undesirable tripping and stepping prevention - DTU Orbit (08/11/2017)

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
Authors: Gronskyte, R. (Intern), Clemmensen, L. K. H. (Intern), Hviid, M. S. (Ekstern), Kulahci, M. (Intern)
Pages: 51-60
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information

Journal: Computers and Electronics in Agriculture
Volume: 119
Issue number: November
ISSN (Print): 0168-1699
Ratings:
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.896 SNIP 1.836 CiteScore 3.27
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.819 SNIP 1.909 CiteScore 2.99
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.976 SNIP 2.128 CiteScore 2.71
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.968 SNIP 2.384 CiteScore 2.89
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.089 SNIP 2.162 CiteScore 2.86
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.077 SNIP 2.245 CiteScore 3
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.663 SNIP 1.694
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1

Scopus rating (2009): SJR 0.717 SNIP 1.536
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.696 SNIP 1.641
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.548 SNIP 1.318
Scopus rating (2006): SJR 0.694 SNIP 1.299
Scopus rating (2005): SJR 0.567 SNIP 1.607
Scopus rating (2004): SJR 0.653 SNIP 1.545
Scopus rating (2003): SJR 0.552 SNIP 1.167
Scopus rating (2002): SJR 0.382 SNIP 0.682
Scopus rating (2001): SJR 0.283 SNIP 0.825
Scopus rating (2000): SJR 0.401 SNIP 1.363
Scopus rating (1999): SJR 0.428 SNIP 1.087
Original language: English
Abnormal behavior detection, Animal welfare, Optical flow, Pig unloading, Video analysis
DOIs:
10.1016/j.compag.2015.09.021
Source: FindIt
Source-ID: 2287674644
Publication: Research - peer-review › Journal article – Annual report year: 2015