InTraDE
Intelligent Transportation for Dynamic Environment

LOOM's contribution to InTraDE

Date:

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Content

- Roles of LOOM in InTraDE
- Deliverables
- Dissemination and knowledge transfer

Roles of LOOM in InTraDE

- **Lead two work-packages**
  - **WP2A3 Virtual Port Environment**
  - **WP3A7 Management of loading and unloading containers**
- **Contribute to other work-packages**

Deliverables - WP2A3 Virtual port environment

- **What have been done?**
  - Offline simulation
    - *Virtual port environment for Dublin FerryPort*
    - *Virtual port environment for Port of Radicatel*
    - *Virtual port environment for Port of Liverpool*
    - *All port simulations have been shown correct via validations against real scenarios in the ports*
  - Online simulation
    - *Online simulation of IAVs in Port of Liverpool*
    - *Contributed 3D objects such as ships and cranes*
  - Integration of all optimisation algorithms from InTraDE partners in an offline simulation framework

Deliverables - WP3A7 Traffic Management & Space Optimisation

- **What have been done by LOOM?**
  - Optimisation algorithms for dynamic environments
    - *Path finder for crane spreaders*
      1000 times faster than existing, published method
    - *Robust fleet sizing algorithm*
      Significantly better than state-of-the-art commercial software
    - *Container stacking strategy*
      Improved existing method by EC'Lille, verified by simulation
    - *Optimal route using TOPSIS*
      Improved existing method by EC'Lille, verified by simulation
  - Integration of all optimisation algorithms from InTraDE partners in an offline simulation framework (done in June 2012)

Dissemination: 10 papers published in peer-reviewed SCI journals/conferences/books

1	C. Li, T. T. Nguyen, M. Yang, S. Yang, and S. Zeng, “Multi-Population Methods in Unconstrained Continuous Dynamic Environments: The Challenges”, Information Sciences, 2014
2	T. T. Nguyen, S. Kavakeb, Z. Yang, I. Jenkinson, and J. Wang, "Identifying the optimal type and number of transfer vehicles to improve productivity in ports – a simulation approach," presented at The 19th Annual Logistics Research Network Conference, UK, 2014.
3	S. Kavakeb, T. T. Nguyen, Z. Yang, and I. Jenkinson, "Identifying the robust number of intelligent autonomous vehicles in container terminals," in The 16th European Conference on the Applications of Evolutionary and Bio-inspired Computation, EvoSTOC, Spain, 2014.
4	S. Kavakeb, T. T. Nguyen, M. Benmerikhi, Z. Yang, & I. Jenkinson, "An improved memetic algorithm to enhance the sustainability and reliability of transport in container terminals," in IEEE Symposium on Computational Intelligence for Security and Defense Applications, Hanoi, Vietnam, 2014.
5	T. T. Nguyen, Z. Yang, I. Jenkinson, “Solving dynamic optimisation problems by combining Evolutionary Algorithms with KD-Tree”, in The 5th IEEE International Conference of Soft Computing and Pattern Recognition, 2013.
6	T.T. Nguyen, Z. Yang, and S. Bonsall, “Dynamic time-linkage problems - the challenges,” in The 9th IEEE – RIVF Conference on Computing and Communication Technologies, Ho Chi Minh City, Vietnam, 2012.
7	J. Dong, J. Wang, S. Bonsall, Z. Yang, and R. Merzouki, “A decision support system for IAV-based container port operations,” In International Forum on Shipping, Ports and Airports IFSPA, 2010.
8	T. T. Nguyen and X. Yao, “Evolutionary dynamic optimisation on continuous dynamic constrained problems – an analysis,” Evolutionary Computation for Dynamic Optimization Problems, Springer-Verlag, pp 193-217, 2013.
9	T. T. Nguyen, S. Yang, J. Branke, and X. Yao, “Evolutionary dynamic optimization: methodologies,” Evolutionary Computation for Dynamic Optimization Problems, Springer-Verlag, pp39-64, 2013.

Dissemination: Follow-up grants

- *Chartered Institute of Logistics and Transport* – "A virtual port simulation/optimisation framework to improve internal logistics and transport of container terminals"
- *Research Council UK Digital Economy NEMODE* – "Studying the economic benefit of enabling digital, innovative technologies in UK/North West Europe container terminal business"
- *Technology Strategy Board* – "VoyagOR - Voyage Optimal Routing in the Cloud"
- *British Council* – "ICT for sustaining and renovating logistics services in Vietnam, a UK-Vietnam research partnership"

Dissemination: Invited talks / keynote speeches

- "Optimisation and Simulation for Traffic Management in Container Ports", *Invited presentation in the workshop of EU MC ENRICH project*, 9-10 October, Edinburgh, UK.
- "Identifying the optimal type and number of transfer vehicles to improve productivity in ports – A simulation approach", *19th Annual Logistics Research Network Conference (LRN)*, 3 -5 September, Huddersfield, UK.
- "Advanced research into freight, logistics, and maritime transport: implications for policy", *Liverpool Chamber of Commerce*, April 2013, Liverpool, UK
- *"*Applying Information Technology to Container Ports - Where Automation Technologies Meet Decision Sciences*" – Fifth IEEE International Conference of Soft Computing and Pattern Recognition, December 2013, Vietnam*
- *"*ICT decision making in ports*" - Third IEEE World Congress on Information, Communication and Technology, December 2013, Vietnam*

Knowledge Transfer: Industrial collaborations

- Peel Ports group:
  - Simulation and optimisation for the new container terminal in Liverpool
  - Possibility of testing the IAVs in Port of Liverpool
- AIMES Grid services
  - Optimisation for maritime transport
  - Simulation for container loading/unloading
- Transport for Greater Manchester
  - Intelligent sensors and decision making for freight transport
- AECOM
  - Smart transport