Live Session : AI in AEC Papers Review

Agenda

- ML Basics
- AI in AEC Overview
- Paper Discussion
- General Discussion
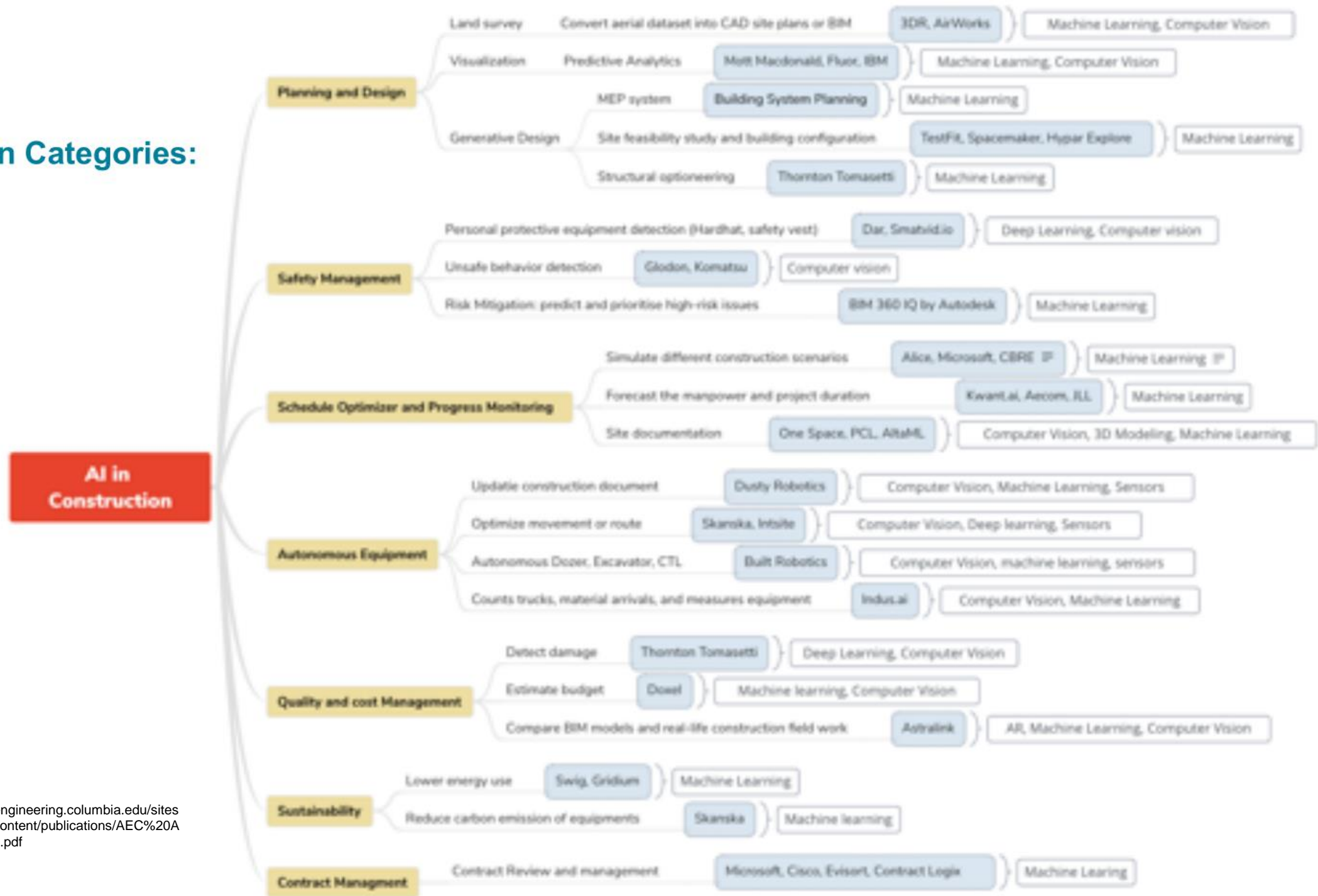
ML Basics

- Neural Network
- CNN
- RNN
- VAE
- GAN

AEC AI APPLICATION

- Events
  - Stanford : AI4AEC
  - DC I/O
  - ETH Zurich
  - Acadia

Seven Categories:

AI in Construction

Planning and Design
- Land survey — Convert aerial dataset into CAD site plans or BIM — 3DR, AirWorks — Machine Learning, Computer Vision
- Visualization — Predictive Analytics — Mott Macdonald, Fluor, IBM — Machine Learning, Computer Vision
- Generative Design
  - MEP system — Building System Planning — Machine Learning
  - Site feasibility study and building configuration — TestFit, Spacemaker, Hypar Explore — Machine Learning
  - Structural optioneering — Thornton Tomasetti — Machine Learning

Safety Management
- Personal protective equipment detection (Hardhat, safety vest) — Dar, Smahtd.io — Deep Learning, Computer vision
- Unsafe behavior detection — Glodon, Komatsu — Computer vision
- Risk Mitigation: predict and prioritise high-risk issues — BIM 360 IQ by Autodesk — Machine Learning

Schedule Optimizer and Progress Monitoring
- Simulate different construction scenarios — Alice, Microsoft, CBRE IF — Machine Learning IP
- Forecast the manpower and project duration — KwantLai, Aecom, JLL — Machine Learning
- Site documentation — One Space, PCL, AltaML — Computer Vision, 3D Modeling, Machine Learning

Autonomous Equipment
- Update construction document — Dusty Robotics — Computer Vision, Machine Learning, Sensors
- Optimize movement or route — Skanska, Intsite — Computer Vision, Deep learning, Sensors
- Autonomous Dozer, Excavator, CTL — Built Robotics — Computer Vision, machine learning, sensors
- Counts trucks, material arrivals, and measures equipment — Indus.ai — Computer Vision, Machine Learning

Quality and cost Management
- Detect damage — Thornton Tomasetti — Deep Learning, Computer Vision
- Estimate budget — Doxel — Machine learning, Computer Vision
- Compare BIM models and real-life construction field work — Astralink — AR, Machine Learning, Computer Vision

Sustainability
- Lower energy use — Swig, Gridium — Machine Learning
- Reduce carbon emission of equipments — Skanska — Machine learning

Contract Managment
- Contract Review and management — Microsoft, Cisco, Evisort, Contract Logix — Machine Learing

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Papers Review

- Paper 1:
  - GAN
  - CGAN

AI Applications

- NVDIA GauGAN (Sketch to Realistic images)
  - http://nvidia-research-mingyuliu.com/gaugan

- Draw together with Neural Network
  - https://magenta.tensorflow.org/assets/sketch_rnn_demo/index.html

General Discussion

- Paper Q n A
- What are some areas of improvement in AEC?
- According to you, what are
- Is there any particular topic you want to know more about in future sessions
- **Feedback :** Tips on improving the structure / content of live sessions to be more effective
- Other questions

Learning Resources

- https://github.com/Mistrymm7/AIforArchitects