Amirhossein Mardan

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Research Interest

- Full waveform inversion
- Seismic data interpretation
- Geophysical monitoring
- Reservoir characterization
- Numerical modeling
- Machine learning

Education

INRS (Québec, Canada) *Sep./2018 - Dec./2022*
Ph.D. Geoscience

Amirkabir University of Technology (Tehran, Iran) *Sep./2014 - Sep./2016*
M.Sc. Petroleum engineering (Exploration seismology)

Science and Research Branch of Islamic Azad University (Tehran, Iran)
B.Sc. Petroleum engineering (Exploration) *Sep./2009 - Sep./2013*

Research Experience

Processing and inversion of near-surface seismic data using deep learning
Industrial postdoctoral fellowship (Polytechnique Montréal, Géostack) *Jan./2023 - present*
Supervisor*: Dr. Gabriel Fabien-Ouellet*
Co-supervisor*: Dr. Bernard Giroux*
Industrial supervisor*: Dr. Martin Blouin*

Monitoring CO_2 saturation using time-lapse seismic FWI
INRS-ETE *Sep./2018 - Dec./2022*
Supervisor*: Dr. Bernard Giroux*
Co-supervisor*: Dr. Gabriel Fabien-Ouellet*

Application of pattern recognition in detecting buried channels in seismic data
Amirkabir University of Technology *July/2015 - Sep./2016*
Supervisor*: Dr. Abdolrahim Javaherian*

Porosity measurement using NMR well logging
Science and Research Branch of Islamic Azad University of Tehran *July/2012 - July/2013*
Supervisor*: Dr. Kamyar Ahmadi*

Teaching Experience

- Autumn 2017, "**Software in exploration seismology such as Petrel, OpendTect, and VISTA**"
- Autumn 2017, "**Reservoir Engineering, Well logging, Geomechanics, and Drilling Engineering**"
  BSc. students, Islamic Azad University
- Autumn 2016, "**Evaluation and estimation of petroleum reservoirs**"
  BSc. students, Islamic Azad University
- Autumn 2015, "**MATLAB and its application in seismology**"
  MSc. students, Amirkabir University of Technology

Work Experience and Internship

- **Mitacs Elevate Postdoctoral Fellow**
  Polytechnique Montréal - Géostack — *Jan./2023 - present*
  Québec, Canada
- **Geophysical Technician**
  Géostack (part-time collaboration) — *Nov./2021 - Dec./2022*
  Québec, QC, Canada
- **Lecturer**
  Islamic Azad University — *Sep./2016 - Jan./2018*
  Tehran, Iran
- **NIOC Exploration Directorate (Internship)** — *June/2013 - Sep/2013*
  Tehran, Iran

Technical Skills

- **Programming language:** Python, C++, HTML, JavaScript, MATLAB
- **Machine-learning:** Pandas, PyTorch, TensorFlow, Scikit-learn
- **Version control:** Git, GitHub
- **Software:** Petrel, OpendTect, HampsonRussell, VISTA

Python competence

Python Package

- Numerical analysis:
  - NumPy
  - SciPy
- Data analysis and machine learning
  - Pandas
  - Scikit-learn
  - PyTorch
  - TensorFlow
- OpenCL (GPU programming)

Open source contribution

- PyFWI (documentation under development)
  PyFWI is a Python package I developed for seismic full-waveform inversion (FWI) and reservoir monitoring (TL-FWI).

Publications

- **Mardan, A.**, B. Giroux, and G. Fabien-Ouellet, **Under revision**, PyFWI: A Python package for full-waveform inversion and reservoir monitoring.
- **Mardan, A.**, B. Giroux, G. Fabien-Ouellet, and M. R. Saberi, **Under revision**, Monitoring fluid saturation in reservoirs using time-lapse full-waveform inversion, Geophysical Prospecting.
- **Mardan, A.**, B. Giroux, and G. Fabien-Ouellet, 2023, Weighted-average time-lapse seismic full-waveform inversion, Geophysics, doi:10.1190/geo2022-0090.1.
- **Mardan, A.**, B. Giroux, G. Fabien-Ouellet, and M. R. Saberi, 2022, Direct monitoring of fluid saturation using time-lapse full-waveform inversion, International Meeting for Applied Geoscience & Energy (IMAGE), Houston, Texas, doi:10.1190/image2022-3746685.1.
- **Mardan, A.**, B. Giroux, and G. Fabien-Ouellet, 2022, Effects of nonrepeatability on time-lapse full-waveform inversion, 83rd EAGE Conference and Exhibition 2022, Madrid, doi:10.3997/2214-4609.202211009.

- **Mardan, A.**, B. Giroux, and G. Fabien-Ouellet, 2022, Time-lapse full-waveform inversion for monitoring the fluid saturation, 83rd EAGE Conference and Exhibition 2022, Madrid, doi:10.3997/2214-4609.202210635.
- **Mardan, A.**, B. Giroux, and G. Fabien-Ouellet, 2022, Time-lapse seismic full-waveform inversion using improved cascaded method, 2nd EAGE Conference On Seismic Inversion, Porto, doi:10.3997/2214-4609.202229003.
- **Mardan, A.**, A. Javaherian, and M. Mirzakhanian, 2018, Channel detection using unsupervised learning techniques, 80th EAGE Conference and Exhibition 2018, Copenhagen, doi:10.3997/2214-4609.201800924.
- **Mardan, A.**, A. Javaherian, and M. Mirzakhanian, 2017, The use of self-organizing maps to identify channel facies in one of the Iranian oilfields, Journal of Exploration and Production, 146, 46-51.
- **Mardan, A.**, A. Javaherian, and M. Mirzakhanian, 2017, Channel characterization using support vector machine, 79th EAGE Conference and Exhibition 2017, Paris, doi:10.3997/2214-4609.201701665.
- **Mardan, A.**, A. Javaherian, and M. Mirzakhanian, 2017, Principal and independent components analysis for channel detecting, 3rd Seminar of Petroleum Geophysical Exploration, Tehran.
- **Mardan, A.**, A. Javaherian, and M. Mirzakhanian, 2016, Channel detection using unsupervised learning algorithms, The 17th Iranian Geophysical Conference, Tehran.
- **Mardan, A.**, A. Javaherian, and M. Mirzakhanian, 2015, A comparison of unsupervised learning techniques for channel detection in 3D seismic data acquired over the Strait of Hormuz, Journal of Research on Applied Geophysics, **1**, 2, 90-102, doi:10.22044/JRAG.2015.649
- **Mardan, A.**, and A. Javaherian, 2015, Improvement of k-means clustering algorithm for fault detection in seismic data, The 3rd National Iranian Petroleum Conference, University of Kerman.

Awards

- Mitacs Elevate postdoctoral fellowship, CAD$160,000.00 *2022*
- High-rank presentation at 83^{rd} EAGE Conference and Exhibition *2022*
- SEG/Landmark Scholarship for US$9,465.9 *2022*
- SEG Foundation Scholarship for US$534.1 *2022*
- IEAGHG International CCS Summer School *2020*
- Ranked 4th in MSc Entrance Exam of Petroleum Exploration Engineering in Iran *2014*