

Curriculum Vitae

Moti Freiman

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Research interests

Medical image analysis and computer-aided surgery:

- medical image segmentation
- multimodality image registration
- fMRI analysis for clinical applications
- medical robotics

Education

- 2006-2010 PhD, School of Engineering and Computer Science,
(expected) The Hebrew University of Jerusalem, Israel.
Advisor: Prof. L. Joskowicz.
- 2003-2005 MSc (Magna cum laude), School of Engineering and Computer Science,
The Hebrew University of Jerusalem, Israel.
Advisor: Prof. L. Joskowicz.
- 2000-2003 BSc, Mathematics and Computer Science Department,
Bar-Ilan University, Ramat-Gan, Israel.

Scholarships and awards

- 2007-2010 The Harry and Sylvia Hoffmann Leadership program for outstanding Ph.D students, The Hebrew University of Jerusalem.
- 2010 SPIE Contingency Student Travel Grant, SPIE Medical Imaging 2010.
- 2009 The Hebrew University of Jerusalem travel grant for Ph.D students.
- 2006-2007 Student Fellowship for graduate students, Leibniz Institute, School of Engineering and Computer Science, The Hebrew University of Jerusalem.
- 2004-2006 Excellent M.Sc students Scholarship, School of Engineering and Computer Science, The Hebrew University of Jerusalem.

Employment

- 2007-2009 Project leader: *Patient-specific preoperative simulation of endovascular surgical procedures* (with Simbionix Ltd.). Ministry of Trade and Industry, MAGNETON Grant 38652.
- 2005 Summer Internship: Research Assistant (Jul.-Sep.) Siemens, Computer Aided Diagnosis. Jerusalem, Israel.
Project title: Tomosynthesis mammographic image processing and visualization.

Teaching and tutoring

- 2005-2009 Lecturer, *Programming workshop in C and C++*. Mandatory undergraduate Course (200 students) School of Engineering and Computer Science, The Hebrew University of Jerusalem. (Ranked 1st among school teachers for fall 2008-9,2009-10.)
- 2009-2010 Teaching Assistant, *Medical Image Processing*. Graduate Course School of Engineering and Computer Science, The Hebrew University of Jerusalem.
- 2007-2009 Tutor, Computer Aided Surgery and Medical Image Processing Laboratory students projects (with focus on registration, segmentation, and classification of medical images).

Professional Activities

- 2009 Co-organizer, MICCAI 2009 workshop:
3D Segmentation Challenge for Clinical Applications:
The Carotid bifurcation algorithm evaluation framework.
- 2009-10 Reviewer, Int. J. of Computer Assisted Radiology and Surgery (IJCARS).
- 2009 Reviewer, BMC Bioinformatics.
- 2009 Reviewer, World Congress - Medical Physics and Biomedical Engineering, 2009.
- 2007 Reviewer, 10th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI'07).

Skills

- Languages: Hebrew (native), English (intermediate)
- Software Development skills: C, C++, ITK, VTK, SVN/CVS, Java, Matlab.

Publications

Refereed journal papers (J)

- J1. Liver tumors segmentation from CTA images using voxels classification and affinity constraint propagation. **M. Freiman**, O. Cooper, D. Lischinski, L. Joskowicz. Accepted to *Int. J. of Computer Assisted Radiology and Surgery (IJCARS)*, May. 2010.
- J2. Surface-based facial scan registration in neuronavigation procedures: a clinical study, R. Shamir, **M. Freiman**, L. Joskowicz, S. Spektor, Y. Shoshan. *J. of Neurosurgery*, Vol. 111(6): 1201–1206, 2009.
- J3. An iterative Bayesian approach for nearly automatic liver segmentation: algorithm and validation, **M. Freiman**, Y. Taieb, O. Eliassaf, L. Joskowicz, Y. Azraq, and J. Sosna. *Int. J. of Computer Assisted Radiology and Surgery*, Vol. 3(5): 439–446, 2008.
- J4. Image-guided system with miniature robot for precise positioning and targeting in keyhole neurosurgery, L. Joskowicz, **M. Freiman**, R. Shamir, M. Shoham, E. Zehavi, Y. Shoshan *Computer-Aided Surgery*, Vol. 11(4):181–193, 2006.

Refereed conference papers

- C1. Non-parametric iterative model constraint graph min-cut for automatic kidney segmentation **M. Freiman**, A. Kronman, S.J. Esses, L. Joskowicz, J. Sosna. *Proc. 13th Int. Conf. on Medical Image Computing and Computer-Assisted Intervention*, To appear.
- C2. Fully automatic segmentation of the kidney Parenchyma in CT images: a shape constrained Expectation Maximization approach. **M. Freiman**, A. Kronman, S.J. Esses, L. Joskowicz, J. Sosna. *24th Int. Conf. Computer-Assisted Radiology and Surgery*, Geneva, Switzerland. To appear.
- C3. Interventional endovascular procedures simulation with patient-specific carotid arteries models generated from CTA scans. **M. Freiman**, E. Nammer, O. Shilon, L. Joskowicz, J. Sosna. Submitted to *24th Int. Conf. Computer-Assisted Radiology and Surgery*, Geneva, Switzerland. To appear.
- C4. An iterative model-constrained graph-cut algorithm for Abdominal Aortic Aneurysm thrombus segmentation. **M. Freiman**, S.J. Esses, L. Joskowicz, J. Sosna. *7th IEEE Int. Symposium on Biomedical Imaging*, Apr. 2010, Rotterdam, The Netherlands.
- C5. Multi-class SVM model for fMRI based classification and grading of liver fibrosis. **M. Freiman**, Y. Sela, Y. Edrei, O. Pappo, L. Joskowicz, R. Abramovitch. *Proc. SPIE Symposium on Medical Imaging 2010*, Feb. 2010, San-Diego, CA. USA.
- C6. Affinity-based constraint optimization for nearly-automatic vessel segmentation. O. Cooper, **M. Freiman**, L. Joskowicz, D. Lischinski. *Proc. SPIE Symposium on Medical Imaging 2010*, Feb. 2010, San-Diego, CA. USA.
- C7. Vessels-Cut: a graph based approach to carotid arteries patient-specific modeling. **M. Freiman**, N. Broide, M. Natanzon, L. Weizman, E. Nammer, O. Shilon, J. Frank, L. Joskowicz, J. Sosna. *Proc. 2nd workshop on: 3D Physiological Human*, Lecture Notes in Computer Science, 5903:1–12, Springer-Verlag, 2009.

- C8. Patient-specific modeling of the carotid arteries for surgical simulation. **M. freiman**, M. Natanzon, N. Broide, L. Joskowicz, L. Weizman. E. Nammer, O Shilon. *23rd Int. Conf. Computer-Assisted Radiology and Surgery*, Berlin, Germany. In: *Int. J. of Computer-Aided Radiology and Surgery*, Springer, Vol. 4 Supplement 1, S81, June 2009.
- C9. Curvelet-based sampling for high-accuracy multi-modal image registration. M. Safran, **M. Freiman**, L. Joskowicz, M. Werman. *Proc. SPIE Symposium on Medical Imaging 2009*, Vol 7259, Feb 2009, Orlando, USA.
- C10. A variational method for vessels segmentation: algorithm and application to liver vessels visualization, **M. Freiman**, L. Joskowicz, and J. Sosna. *Proc. SPIE Symposium on Medical Imaging 2009*, Vol 7261, Feb 2009, Orlando, USA.
- C11. Classification of suspected liver metastases using fMRI images: a machine learning approach, **M. Freiman**, Y. Edrei, Y. Sela, Y. Shmidmayer, E. Gross, L. Joskowicz, R. Abramovitch. *Proc. 11th Int. Conf. on Medical Image Computing and Computer-Assisted Intervention*, Lecture Notes in Computer Science, 5241:93–100, Springer-Verlag, 2008.
- C12. A Bayesian approach for liver analysis: algorithm and validation study **M. Freiman**, O. Eliassaf, Y. Taieb, L. Joskowicz, J. Sosna. *Proc. 11th Int. Conf. on Medical Image Computing and Computer-Assisted Intervention*, Lecture Notes in Computer Science, 5241:85–92, Springer-Verlag, 2008.
- C13. An iterative Bayesian approach for livers segmentation: algorithm and clinical validation study. **M. Freiman**, O. Eliassaf, Y. Taieb, L. Joskowicz, Y. Azraq, J. Sosna. *22nd Int. Conf. Computer-Assisted Radiology and Surgery*, Barcelona, Spain. In: *Int. J. of Computer-Aided Radiology and Surgery*, Springer, Vol. 3 Supplement 1, S125-126, June 2008.
- C14. Statistical tumor model construction and classification from fMRI maps for liver metastases early detection. **M. Freiman**, Y. Edrei, E. Gross, L. Joskowicz, R. Abramovitch. *Proc. 5th IEEE Int. Symposium on Biomedical Imaging*, Paris, France, May 2008.
- C15. Surface-based preoperative CT/MRI to intraoperative face scan registration: a clinical study, R. Shamir, **M. Freiman**, L. Joskowicz, E. Zehavi, F. Umansky, Y. Shoshan. *21st Int. Conf. Computer-Assisted Radiology and Surgery*, Berlin, Germany. In: *Int. J. of Computer-Aided Radiology and Surgery*, Springer, Vol. 2 Supplement 1, S209, June 2007.
- C16. Computer assisted early detection of liver metastases from fMRI maps, **M. Freiman**, Y. Edrei, R. Abramovitch, L. Joskowicz. *21st Int. Conf. Computer-Assisted Radiology and Surgery*, Berlin, Germany. In: *Int. J. of Computer-Aided Radiology and Surgery*, Springer, Vol. 2 Supplement 1, S381-382, June 2007.
- C17. A feature-based transfer function for liver visualization, **M. Freiman**, L. Joskowicz, D. Lischinski, J. Sosna. *21st Int. Conf. Computer-Assisted Radiology and Surgery*, Berlin, Germany. In: *Int. J. of Computer-Aided Radiology and Surgery*, Springer, Vol. 2 Supplement 1, S125-126, June 2007.
- C18. Robot-assisted image-guided targeting for minimally invasive neurosurgery: planning, registration, and in-vitro experiment, R. Shamir, **M. Freiman**, L. Joskowicz, M. Shoham, E. Zehavi, Y. Shoshan, *8th Int. Conf. Medical Image Computing and Computer-Aided Intervention*, Lecture Notes in Computer Science, 3750:131–138, Springer-Verlag, 2005.

- C19. Miniature robot-based precise targeting system for keyhole neurosurgery: concept and preliminary results, L. Joskowicz, M. Shoham, R. Shamir, **M. Freiman**, E. Zehavi, Y. Shoshan, *19th Int. Conf. Computer-Assisted Radiology and Surgery, CARS'2005*, H.U. Lemke et. al. eds., Springer-Verlag, Berlin, Germany, June 2005,

Submitted papers

- S1. Curvelets: a patient-specific prior for accurate multi-modal image registration. **M. Freiman**, L. Joskowicz, M. Werman. Revised version submitted to *Medical Image Analysis*, Mar. 2010.
- S2. Patient-specific carotid arteries modeling: a nearly automatic model-based graph-cut approach. **M. Freiman**, L. Joskowicz, N. Broide, M. Natanzon, E. Nammer, O. Shilon, L. Weizman, J. Sosna. Revised version submitted to *Medical Image Analysis*, May. 2010.

Others (O)

- O1. Min-Cut Method for Liver Vessel Segmentation from MDCT: Algorithm Assessment and Verification. J. Sosna, N. Lev-Cohen, N. Broide, M. Natanzon, **M. Freiman**, and L. Joskowicz *Proc. 95th Radiological Society of North America Annual Meeting, RSNA '09*, Chicago, USA, 2009.
- O2. Nearly automatic vessels segmentation using graph-based energy minimization. **M. Freiman**, J. Frank, L. Weizman, E. Nammer, O. Shilon, , L. Joskowicz and J. Sosna *Proc. 3D Segmentation in the Clinic: A Grand Challenge III workshop, 12th Int. Conf. on Medical Image Computing and Computer-Assisted Intervention*, London, UK, 2009.
- O3. Implementation of weighted Dijkstras shortest-path algorithm for n-D images L. Weizman, **M. Freiman**, L. Joskowicz. *The Insight journal*, 2009.
- O4. An iterative Bayesian approach for liver analysis: tumors validation study. O. Eliassaf, Y. Taieb, **M. Freiman**, L. Joskowicz, J. Sosna. *Proc. 3D Segmentation in the Clinic: A Grand Challenge II workshop, 11th Int. Conf. on Medical Image Computing and Computer-Assisted Intervention*, New York, USA, 2008.
- O5. Robot-assisted image-guided targeting for minimally invasive neurosurgery: intraoperative robot positioning and targeting experiment. R. Shamir, **M. Freiman**, L. Joskowicz, M. Shoham, E. Zehavi, Y. Shoshan. *Proc. Medical Robotics workshop, 9th Int. Conf. on Medical Image Computing and Computer-Assisted Intervention*, Denmark, 2006.
- O6. Preoperative planning and intraoperative registration for robot-based keyhole neurosurgery. **M. Freiman**. M.sc thesis. School of Engineering and Computer Science, The Hebrew University of Jerusalem, Israel. 2005.

References

- Prof. L. Joskowicz, School of Engineering and Computer Science, The Hebrew University of Jerusalem, Israel. (josko@cs.huji.ac.il).
- Dr. J. Sosna, Dept. of Radiology, Hadassah Hebrew University Medical centre, Jerusalem, Israel. (jacobs@hadassah.org.il).
- Dr. R. Abrmovitch, The G. Savad Inst. for Gene Therapy, and MRI/MRS Lab HBRC, Hadassah Hebrew Univ. Medical Center, Jerusalem, Israel. (rinat@hadassah.org.il).