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Ailon et al.: Preference-Based Learning to Rank **ailon10**

N. Ailon and M. Mohri. "Preference-Based Learning to Rank." In: *Machine Learning* 80.2-3 (2010), pp. 189–211. Springer.

- useful keywords for future search: prefence-learning to rank, prefernce-based, score-based
- some pointers to other learning to rank literature
- otherwise based on binary classification, thus probably not relevant here
- TODO: References

Ayaz et al.: Tangram Solved? Prefrontal Cortex Activation Analysis During Geometric Problem Solving **ayaz12**

H. Ayaz, P. A. Shewokis, M. Izzetoglu, M. Cakir, and B. Onaral. "Tangram Solved? Prefrontal Cortex Activation Analysis During Geometric Problem Solving." In: *Engineering in Medicine and Biology Society (EMBC), 2012 Annual International Conference of the IEEE*. IEEE. 2012, pp. 4724–4727.

- experiment to measure brain activity during solving of a tangram
- right hemisphere is more active
- increase in brain activity similar to other cognitive tasks
- difference to arithmetic tasks with linguistic representation?

Baran et al.: How Do Adults Solve Digital Tangram Problems? Analyzing Cognitive Strategies Through Eye Tracking Approach **baran07**

B. Baran, B. Dogusoy, and K. Cagiltay. "How Do Adults Solve Digital Tangram Problems? Analyzing Cognitive Strategies Through Eye Tracking Approach." In: *Human-Computer Interaction. HCI Intelligent Multimodal Interaction Environments*. Ed. by J. A. Jacko. Vol. 4552. LNCS. Springer, 2007, pp. 555–563.

- comparision of solution approaches for tangrams with vayring difficulty
- differences shown in fixation cound, task completion duration and transition number, part of the screen most focused on

Bell: Solving Tangrams Using JTS **bell12**

B. Bell. *Solving Tangrams Using JTS*. Sept. 24, 2012. URL: `https://bjbell.wordpress.com/2012/09/24/solving-tangrams-using-jts/` (visited on 02/01/2015)

. Cai et al.: The Research on the Difficulty Grade and the Piecing Skills of Tangram cai08

S. Cai, Y. Jiang, and M. Zeng. *The Research on the Difficulty Grade and the Piecing Skills of Tangram*. Shenzheng Foreign Languages School. 2008. URL: `http://www.yau-awards.org/Notice.php` (visited on 1/19/2015).

- description of three ways to calculate the probability of the pattern, each requires to know all possible solutions to the pattern
- 1. way: probability based on correct placement of a piece and number of ways it could be placed (number of rotations that result into a different piece) - measure should result in the same probability for each solution and is just scaled by number of solutions (which is later scaled according to experiments again?)
- 2. way: probabilty based on possibilites to reach a certain length, unclear which length are being taken into account
- 3. way: probability based on cutting of basic shapes
- overall:
- patterns that are more regular are harder, patterns where there is only one possibilty to place a piece a easier.
- seems computationally costly to automate (full solution computation and multiple orders of placement)
- (very bad English, should this be cited?)

Cheng et al.: An Algorithm for Automatic Difficulty Level Estimation of Multimedia Mathematical Test Items cheng08

I. Cheng, R. Shen, and A. Basu. "An Algorithm for Automatic Difficulty Level Estimation of Multimedia Mathematical Test Items." In: *ICALT '08 Proceedings of the 2008 Eighth IEEE International Conference on Advanced Learning Technologies*. IEEE. 2008, pp. 175–179.

- automatic difficulty estimation for computer-adaptive testing
- somehow based on response time
- more about how to construct the optimal test for each student using Item Responce Theory (more difficult when correct answer, easier when wrong answer)

Cocchini: Wanderings Around Tangram cocchini10

F. Cocchini. *Wanderings Around Tangram*. Lulu.com, 2010.

- hard patterns have as many matched edges and vertices as possible
- percentage X of how far of the patters is from being convex
- not written very good, only 3 chapters available

Coffin: The Puzzling World of Polyhedral Dissections - Chapter 1 - Two-Dimensional Dissections **coffin98**

S. T. Coffin. *The Puzzling World of Polyhedral Dissections - Chapter 1 - Two-Dimensional Dissections*. Ed. by J. Rausch. 1998. URL: `http://www.johnrausch.com/PuzzlingWorld/chap01.htm` (visited on 02/01/2015)

. Cohene et al.: The Making of the Tangrambler **cohene02**

T. Cohene, S. Dack, O. Dufourmantelle, and M. Saunders. "The Making of the Tangrambler." In: *Human-Computer Interaction* 304 (2002), 424B.

- description of the design of a physical imlementation of a Tangram game in several steps
- much analysis and evaluation based on HCI principles (as development of the prototype was part of an HCI course)
- Tangram also called "seven shapes of cleverness"

Deutsch et al.: A Heuristic Solution to the Tangram Puzzle **deutsch72**

E. S. Deutsch and K. C. Hayes Jr. "A Heuristic Solution to the Tangram Puzzle." In: *Machine Intelligence* 7.Bernard Meltzer and Donald Michie (1972), pp. 205–240. Edinburgh University Press.

- pieces are either three
- or four-sided -> reduces the number of common edges two or more pieces can share
- proposed solution does not work for every tangram (puzzles with holes for example)
- combinatorics approach involves large amount of computation
- heuristic approach uses number of rules that are applied successively in a certain order
- based on splitting the puzzle in easier subpuzzles
- "number of corners or vertices of a tangram shape contains considerable information" -> less corners give less information about the structure and how pieces are placed -> solution for puzzles for 11 corners or more
- save tangram (Figure 4) as vertices' numbers and edge links (node
- (x,y) cords
- linked to node, edge length, direction)
- computation of so-called extension lines -> convex (location of a piece) and concave (location of a line connecting two pieces) type vertices -> disregard lines that are too short to support a puzzle piece or extension lines that are too close to a parallel edge

– multiple matching rules -> direct, trying to fit multiple pieces all at once (composites also only three
– or four-sided)
– possible hints on how to find all possible location for one puzzle piece (?)

Duh et al.: Learning to Rank with Partially-Labeled Data **duh08**

K. Duh and K. Kirchhoff. "Learning to Rank with Partially-Labeled Data." In: *Proceedings of the 31st Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*. ACM. 2008, pp. 251–258.

– usage of unlabeled test data to improve ranking, generating better features and incoorporating those features
– unsupervised learning algorithm to find pattern, then project training data onto these patterns and use resulting numerical values as new features
– keyword: Learning to Rank with missing labels

Eberle: The Role of Children's Mathematical Aesthetics: The Case of Tessellations **eberle14**

R. S. Eberle. "The Role of Children's Mathematical Aesthetics: The Case of Tessellations." In: *The Journal of Mathematical Behavior* 35 (2014), pp. 129–143

. Eisenman et al.: Aesthetic Preferences of Art Students and Mathematics Students **eisenman64**

R. Eisenman and S. Coffee. "Aesthetic Preferences of Art Students and Mathematics Students." In: *Journal of Psychology* 58 (1964), pp. 375–378

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J. Elffers. *Tangram. Das alte chinesische Formenspiel*. Du Mont, 1978

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F. F. Faria, A. Veloso, H. M. Almeida, E. Valle, R. d. S. Torres, M. A. Gonçalves, and W. Meira Jr. "Learning to Rank for Content-Based Image Retrieval." In: *Proceedings of the International Conference on Multimedia Information Retrieval*. ACM. 2010, pp. 285–294

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D. Filonik and D. Baur. "Measuring Aesthetics for Information Visualization." In: *Information Visualisation, 2009 13th International Conference*. IEEE. 2009, pp. 579–584

. Fox-Epstein et al.: The Convex Configurations of "Sei Shonagon Chie no Ita" and Other Dissection Puzzles **foxepstein14**

E. Fox-Epstein and R. Uehara. "The Convex Configurations of "Sei Shonagon Chie no Ita" and Other Dissection Puzzles." In: (2014). arxiv preprint: `arxiv:1407.1923v1[cs.CG]`

. Galanter: Computational Aesthetic Evaluation: Past and Future **galanter12b**

P. Galanter. "Computational Aesthetic Evaluation: Past and Future." In: *Computers and Creativity*. Springer, 2012, pp. 255–293

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P. Galanter. "Computational Aesthetic Evaluation: Steps Towards Machine Creativity." In: *ACM SIGGRAPH 2012 Courses*. SIGGRAPH '12. New York, NY, USA: ACM, 2012, 14:1–14:162

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K. Haraguchi, Y. Abe, and A. Maruoka. "How to Produce BlockSum Instances with Various Levels of Difficulty." In: *Journal of Information Processing* 20.3 (2012), pp. 727–737

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C. He, C. Wang, Y.-X. Zhong, and R.-F. Li. "A Survey on Learning to Rank." In: *2008 International Conference on Machine Learning and Cybernetics*. Vol. 3. IEEE. 2008, pp. 1734–1739

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M. Hunt, C. Pong, and G. Tucker. "Difficulty-Driven Sudoku Puzzle Generation." In: *UMAP Journal* (2007), pp. 343–362

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P. Jarušek and R. Pelánek. "Difficulty Rating of Sokoban Puzzle." In: *STAIRS 2010: Proceedings of the Fifth Starting AI Researchers' Symposium*. IOS Press. 2010, p. 140

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D. Joshi, R. Datta, E. Fedorovskaya, Q.-T. Luong, J. Z. Wang, J. Li, and J. Luo. "Aesthetics and Emotions in Images." In: *Signal Processing Magazine* 28.5 (2011), pp. 94–115

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M. Siqueira Júnior, R. M. Alves, E. W. G. Clua, E. B. Passos, C. R. d. Silva, A. A. Montenegro, and J. C. Oliveira. "A Novel Algorithm to Verify the Solution of Geometric Puzzle Games." In: *Proceedings of the 2009 VIII Brazilian Symposium on Games and Digital Entertainment*. IEEE Computer Society. 2009, pp. 9–16

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- Sam Loyds book full of errors (7)
- mention of Japanese dissection puzzle (Sei Shonagon) (12)
- proof of pythagoran theorem as origin of tangrams? (15)

- name not originally chinese (23)
- found original, mostly later, dates to published tangrams claimed to have other publishing dates (60)
- paradoxal tangrams (100)
- many tangram examples

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