

# Metadata Generation with Game with a Purpose in the Multimedia Domain

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The emergence of Web 2.0 technologies and their wide adoption has transformed static internet into dynamic environment, which provides the means to not only access, but also create, share and modify existing content. Users now engage in a consumer-producer model and produce large quantity of user-generated content - known for its heterogeneous nature, short-livedness and containing a lot of waste product. Despite the difficulties, it is important to be able to manage the content and related data. To enable this, it is critical to employ machines and automation to preprocess the content for human access. Machines must understand the content and its context. For this to be possible, a homogenous metadata layer must be first generated on top of the content, which identifies its properties and relationships. Acquiring metadata can be no easy task, as it paradoxically requires intricate knowledge and understanding of the very content in the first place.

Metadata acquisition can be driven by experts, crowd or machines [1]. Expert driven approaches rely on knowledge of experts and produce limited amount of high quality metadata. Crowd driven approaches are more scalable as they harness knowledge of the ‘crowd’ – large number of people, but the quality of the output is lower. They can still provide significantly better results as machine driven approaches.

Our aim is to use elements of gamification on crowd driven metadata acquisition in image domain. We attempt to create solution, capable of generating similarity index between any two images in provided dataset, with satisfactory correctness. For this we create a game with a purpose (GWAP), which has players play and indirectly solve the problem transformed into a game mechanics. GWAPs are now acknowledged solution to metadata acquisition with Google Image Labeller, a revision of ESP Game [2], being widely adopted by Google Inc. to support its image search.

We devise minimalistic multiplayer output agreement board game to gather semantics of the image content by having players move images across the board. By analysing the state of the board, we can draw conclusions about the relationships between the image resources.

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Each player is given a 3x3 image board (see Figure 1) with the same images positioned differently. The game has players swap the images and rewards them for placing same images close to each other. Because the other players' boards remain hidden to the player, he must come up with a heuristic to discover the ideal state of the board that other players would hopefully follow. With no other hints, the ideal state must reflect the relationships between the images, which can be extracted as metadata.

Some of the comparable solutions include the image annotating ESP Game – where players write words to describe an image and are rewarded for matches, Peekaboom [3] – a modification which identifies location of the objects within an image or PexAce, derivation of Concentration, where a player can label the flipped image. Very similar game to our solution is Curator [4] which tasks players to make collection out of given images based on how well the objects in them go well together.

Our game differentiates itself from existing solutions in several ways. It is interactive and does not strain players with repetitive or uninteresting actions like writing annotations as in case of ESP Game or PexAce. It is fast, evaluating board every 5 seconds, and dynamic, because in every cycle the player is hinted which images other player positioned similarly, and must reevaluate his future and past moves. Swapping two images involves evaluating them in the context of both their neighbours. Thus, the player's focus does not lie on a single image, rather the board as a whole. The board then becomes a puzzle for the player to solve. Our game also provides strong socialization aspects. Players both try to solve the board puzzle in unison and compete at the same time.

We plan on carrying out closed and open experiment. We begin by manually creating initial game data in order to prevent cold start problems. Closed experiment will involve several people in a controlled environment to test the prototype of the game and fine-tune the game mechanics. The open experiment will make use of publicly accessible version. Each and all players' actions will be logged and available to offline processing at the end of the experiment. We will construct a weighted graph based on image positions and juxtapose image similarity with expert data.

The game is being implemented in Java as an RIA or an applet using AppWarp S2 game engine using authoritative server model to avoid malicious player behavior (<http://appwarps2.shephertz.com/>). Our GWAP is trying to appeal as a standalone game and at the same time generate metadata usable for image search and discovery.

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## References

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