Exploring the Design of an Inspirational ISAR
for use by Artists

1 Introduction

1.1 Purpose

This paper explores the design of an information storage and retrieval system (ISAR) meant to inspire artistic creativity in its users. I will propose a design for such a system below and discuss the capabilities, challenges and limitations of my design.

1.2 ISARs and the Nature of Creativity

There are many different perspectives on creativity. Theories span epistemological, artistic and social science venues. For our purposes here, let us adapt a theory about creativity that combines two generally acceptable theories: That creativity is the amusing, serendipitous or profound combination of ideas. Thus, an ISAR with the purpose of eliciting creativity must encourage new idea combinations; let us refer to these as associations.

1.3 ISARs and the Nature of Inspiration

Inspiration is even harder to define than creativity. Let us assume that inspiration occurs when a human is exposed to information that interacts favorably with information he already possesses, resulting in his sudden understanding of a new idea. Consequently, an inspirational ISAR has the task of exposing the user to information that will inspire him to make new associations. We must therefore establish a system that will expose the user to information that is targeted to interact favorably with information he already possesses.
1.4 ISARs and Artistic Creativity

It may be deduced that artistic creativity is the expression of inspired associations through an artistic medium. If a user wanted inspiration for creating a new kind of surgical instrument, he would expose himself to current surgical instruments; he would study them and think about their construction, their use, and the results of their use. Inspiring a user to create art is much the same. This is why the inspirational ISAR discussed below will expose the user to existing artistic works. Theoretically, these existing artworks may include literature, sculpture, architecture or films. However, it is only logistically possible for this ISAR to store short passages of text such as poetry and graphical images such as paintings, woodcuts, and photographs.

1.4.1 Two Facets of Artistic Experience

Further complicating things, there are two facets of artistic experience. One facet focuses on the intrinsic value of the artistic object, guided by artistic elements and principles such as meter in a poem or composition in a drawing. The other focuses on the art object’s content and the context in which that content functions. A good example of this is learning about the character depicted in a painting and how the painter’s audience perceived this character at the time the painting was created. Let us call these two facets of artistic experience (1) artistic if it focuses on artistic principles and elements and (2) contextual if it focuses on the art object’s content and the context of that content. Artistic inspiration works similarly to artistic creation. An artist may be inspired by the shapes and colors or by values reflected in subject-matter. Therefore, both facets of artistic experience must be accounted for in the design of this inspirational ISAR.
The process that is required from this inspiration ISAR is similar to the creation of a mind map except that the system’s job is to inspire associations within the mind of the user specifically for his use in artistic creation, regardless of the preferred medium.

2 Framework for an Inspirational ISAR

2.1 Random Generation of Art Objects Versus Targeted Retrieval

The function of this ISAR is peculiar in that it seeks not to retrieve relevant objects based on queries but to retrieve objects that will relate with the user in an unexpected yet favorable way. This implies that the user must not necessarily expect the results he is given, which, in turn, make the usefulness for such an ISAR doubtful. However, the results are required to interact favorably with the user’s mind. Random generation of text and images, though it could be successful, has only a small likelihood of hitting the mark.

Thus, the system must begin with user input and use it to retrieve targeted art objects. This is not to say that the ISAR’s functions will be identical to the traditional search or query because the user does not seek any specific result. The goal is to base the presentation of inspirational art objects on the user’s input and presenting it in a way that is conducive to artistic inspiration.

2.2 Summary of the Sequence of Functions

Textual input (a query) from the user must prompt the system to analyze the query and to subsequently associate it with art objects using spreading activation. The associated art objects, rated in terms of their weighted associative relationships to the query terms, must be presented to
the user one by one, allowing time for the user’s interaction with and exploration of the object. If the user is unmoved or disinterested in a presented object, he or she may pass on to the next one.

2.3 Designing More than just a Database of Art Objects

The display of the result pool is crucial to the design of a bona fide inspirational ISAR. The term *result pool* is preferable over any other because it does not signify a list of results. The danger in returning a distinct list of search results is that the system may function as nothing more than a database of art objects. This failure would particularly be a threat if the system functioned too literally, retrieving art objects directly related to the user’s input like a traditional database returns search results relevant to a query. That process, though similar to the one discussed below, is not ideal for this kind of system and alternatives must be considered.

For example, let us imagine that a user types in the word *lonely* and the search returns all cataloged instances of loneliness in its bank of art objects. The results would be a list of art objects dealing with loneliness. Though it certainly could result in artistic inspiration, this system is nothing more than a database operating on a store of art objects that have been subject cataloged. The problem is that in this model, the process is too direct. It does not allow for any further expansion on the idea; it simply regurgitates the user’s input in terms of its art objects.

In order to bring true inspiration to the user, he must be exposed not only to instances of his idea in the subject-matter of art, but to related ideas, new ways of presenting his idea, or multiple facets of the idea operating in varied and foreign contexts. Upon entering *lonely*, the user must be stimulated with art objects associated with all the different facets of loneliness: physical loneliness (which may be associated with wilderness or death or being the only person in a big room, etc.) and personal loneliness (which may be associated with widowhood,
depression, emptiness, abandonment, marginalization, etc.) or a related term such as *emptiness* (which could be further associated with an empty stadium, an empty womb, an empty glass, an empty life, etc.) The goal is to provide the user with a collision of concepts that are associated in ways he or she has never contemplated before, in an attempt to inspire them to embody this inspiration in artistic creation. Furthermore, this collision of concepts must be precipitated on two levels, taking into consideration the two modes of artistic experience discussed above.

3 The Nature of an Inspirations ISAR’s Information Store

3.1 Free Association and Subject Cataloging

How will the system know what art objects to associate with the user’s input? The answer may be found by considering the way people experience art, artistically and contextually. This inspirational ISAR needs to retrieve associated art objects using two layers of indexing, one describing the artistic principles used in the work, or the object itself, and the other describing the content and context of the work. The two facets may often agree; a painting with a sad subject-matter may also use colors associated with sadness, for example. In fact, this will often, but not always be the case.

The term *association* is used here in a purposely ambiguous way. This is because the relationship between the query, the descriptors and the art objects is meant to be ambiguous. The only relationship type is <isAssociatedwith>. This is the only relationship that catalogers will use but they will be able to indicate the degree of association using weights. There is no need for other relationships used traditionally in cataloging art such as <isCreatedby> or <createdInyear>, etc. We are only concerned with the associative characteristics of the work. We have no interest
in being able to retrieve specific art objects or art objects by specific authors or objects that treat a certain subject in a certain way.

3.1.1 Cataloging Challenges using Free Association

This associative relationship between the artistic principles used in the work and the work’s content and context is subjective. Naturally, one person might not associate a certain color with sadness when another person does but the same can be said regarding subject-matter. The subjectivity of the cataloging is less of a problem for this type of system using free association than it is with a traditional ISAR which has the purpose of locating precisely sought information. Nonetheless, this loose method of cataloging has potential for errors, which is always a consideration for an ISAR of any type.

The biggest challenge faced by this method of cataloging is establishing to what degree of association the system will spread. Without the use of very specific relationship types, the use of spreading activation is problematic. It may be said that everything is associated with everything to some degree. This would result in the retrieval of all art objects every time the system is used, rendering any kind of cataloging useless. If every object is going to be retrieved every time, then why not just call up the art objects randomly? I believe a technical solution to this pitfall is an appropriate degree of abstraction via the use of what I call idea modules.

3.2 Idea Modules

Borrowed from Arthur O. Lovejoy’s concept of unit-ideas, idea modules attempt to encompass a common idea portrayed in or by art. The mother idea is associated with all of the descriptors within its umbrella. These are the same descriptors that will be used when cataloging the art
objects. The same descriptors can be found in other modules be it people, emotions, actions, etc. but each idea module is a closed unit. Therefore, once the user query is associated with one idea module, that module is activated and the query’s associations only spread to the limits of the module. So as not to confine the result pool, the user should have the choice of activating one or more module(s) as he selects search parameters.

Once the idea module is activated, the system retrieves from its bank whatever artistic objects (text or graphics) share the most descriptors with the assigned idea module(s). In short, the idea modules function loosely as a two-way descriptor-find index except that the modules are pre-built. Using a traditional descriptor-find index, the user query is factored down to an elemental concept (the mother idea of an idea module) and then once the idea module is activated, the concept is expanded upon once more. Though this may be considered onerous, I believe it provides the result pool with the appropriate degree of abstraction needed for this non-traditional ISAR.

3.2.1 Example of an Idea Module

See to the left an example of an idea module for betrayal. In response to the query of infidelity, the system associates the query with the appropriate idea module. Often the mother idea for the module will be identical to the user’s query. Other times it may be a synonymous term, a narrower term, a broader term or a related term. For the sake of the example, let us assume the most relevant module to the query is betrayal.

<table>
<thead>
<tr>
<th>BETRAYAL IDEA MODULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jealousy</td>
</tr>
<tr>
<td>Benedict Arnold</td>
</tr>
<tr>
<td>Cheating</td>
</tr>
<tr>
<td>Sorrow</td>
</tr>
<tr>
<td>Abandonment</td>
</tr>
</tbody>
</table>
The association of each descriptor to the idea module is weighted and included in the calculation used to decide whether or not to retrieve an art object containing relevant descriptors. For example \textit{Benedict Arnold} would be much more heavily associated with \textit{betrayal} than \textit{sorrow}, which is still related but less specific to betrayal. All of the art objects sharing a high percentage of highly-weighted descriptors with the betrayal module are retrieved. The user should be able to control the degree of abstraction during input. The percentage of highly-weighted descriptors would increase and the percentage of lesser-weighted descriptor would decrease if he chooses a low level of abstraction. The opposite would take effect if he chose a high level of abstraction.

4 The Inspirational ISAR’s Information Storage Structure

4.1 Summary of the Information Storage Structure

Given the simplicity of the relationships and the vast volume of descriptors, it makes sense to group the entity types into separate sets. [See Figure 4.2 on page 9.] The first set (Entity Type Set A) consists of the entity types needed to indicate the artistic principles and elements encompassed in the art object. The second set (Entity Type Set B) consists of the entity types needed to indicate the context of the art object. The third is a set of entity types that the other two share, a common pool of descriptor types with which Sets A and B will be associated. Storing entity type sets A and B separately will allow the system to easily exclude one or the other layer if they so choose. If a user wishes the system to retrieve mostly art objects that are contextually associated with his input, then he can indicate such and the system can automatically devalue art objects with greater artistic than contextual associations (i.e. art objects whose common descriptors hail more from Set A than Set B.)
4.2 ISAR Storage Model

**ENTITY TYPE SET A: ARTISTIC**
- Color
- Line
- Shape
- Movement
- Composition
- Contrast
- Texture
- Space
- Form
- Value
- Emphasis
- Balance
- Harmony
- Variety
- Meter
- Proportion
- Unity
- Metaphor
- Onomatopoeia
- Rhyme
- Assonance

**ENTITY TYPES FOR DESCRIPTORS**
(Shared by SETS A & B)
- Emotions
- Actions
- Non-emotive Adjectives
- Verbs
- People
- Places
- Objects

**ENTITY TYPE SET B: CONTEXTUAL**
- Creator
- Subject
- Social Class
- Politics
- Action
- History
- Intended Audience
- Audience Reception
- Characters
- Patron
- Scholarship

**IDEA MODULES**
- Sorrow
- Gaiety
- Coldness
- Emptiness
- Fullness
- Loveliness
- Betrayal
5 Information Retrieval

5.1 A Search Model

Query:

<table>
<thead>
<tr>
<th>User input</th>
<th>Associated Idea Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;sad&gt;</td>
<td>SORROW</td>
</tr>
<tr>
<td>&lt;marriage&gt;</td>
<td>MARRIAGE</td>
</tr>
<tr>
<td>&lt;God&gt;</td>
<td>GOD</td>
</tr>
</tbody>
</table>

Retrieved Objects:

A

* Toward Evening
* Toward evening there was thunder and Lightning. Why was the lady sad?
* The high lord did not reveal his majesty
* What was he seeking?

B

Note:
Object A is an ancient Chinese poem written in 100 B.C.E. and Object B is *Expulsion from the Garden of Eden* on the walls of the Brancacci Chapel in Florence.
5.2 Analysis of Search Model

Object A Retrieval Model

ARTISTICALLY:
Meter> Stilted> Frustration
Discontent> SORROW(sad)
Confusion
The meter in this poem is stilted. Stilted meter could indicate any number of emotions, a few of which would be frustration, discontent or confusion. Discontent is within the purview of the Sorrow ideal module which has been assigned to the input sad.

CONTEXTUALLY:
Subject> Sadness> SORROW(sad)
Lord> GOD
Lightning> Zeus> GOD
Scholarship> MARRIAGE
The poem’s subjects (sadness and lord) associate directly to two of the relevant idea modules and lightning associates with Zeus who associates with the relevant idea module God. Scholarship about the poem refers mostly to marriage, indicating that the poem is associated by many with an unhappy marriage.

Object B Retrieval Model

ARTISTICALLY:
Color> Muted> SORROW
Mood> SORROW
The painting’s colors are muted, immediately associated with the idea module sorrow. The image’s mood, indicated by the color as well as by the figures’ body language and facial expressions, is directly linked to sorrow.

CONTEXTUALLY:
Characters> Adam & Eve> MARRIAGE
GOD
Subject> Expulsion> SORROW
The characters of Adam & Eve are associated with both marriage and God, and the story of expulsion (the subject) is directly associated with sorrow.
6 Limitations and Areas in Need of Improvement

6.1 The Uselessness of Distinguishing Entity Types

The entity types displayed in Figure 4.2 do not, at this point, have any further relevance beyond the cataloging stage. Catalogers need them in order to define the associations that an art object has to its assigned descriptors but entity type sets do not necessarily need to be entered into the system since only the cataloger needs to know which specific entity type is associated with which specific descriptor. The descriptors only need to be associated with which set they come from, so that the user knows if the association is artistic or contextual in nature.

This, of course, is not the case if the system offers the user a way to specify them in a search. For example, if a user enters "womb" and can specify that he wants only the art objects whose colors are somehow associated to "womb", then it is necessary to indicate the associative relationships outright to the system but at this point, the descriptors are just floating in a giant pool, waiting to be associated with an idea module (only separable by Sets A and B.) This could be possible using the system framework that I have developed but problems would arise if the user’s query did not match up perfectly with an idea module.

6.2 Input Limitations

This system’s restriction to textual user input (in the form of single words or phrases) renders the system less useful to those who cannot or will not use express their query in those terms. What if a user is unable find the right word or phrase to express an idea they have or what if the user is unable to speak English at the level he must in order to use the system? Furthermore, homonyms could pose of problem since user queries tend to be one word only. In short, the usefulness of this ISAR is limited by its input specifications.
One improvement to the current system would be to allow users to enter longer textual input, like sentences or poems. The system would need to be programmed to analyze complicated language structures. It would be much more difficult for the system to factor the input into elemental ideas and once it did, there is likely to be so many elemental ideas that choosing one idea module to relate to them would be difficult if not impossible.

Another improvement to the current system would be to allow users to enter graphical input but this would require significant work to the structure of the system. The ISAR would be required to analyze the graphical input and then associate it with other graphical or textual art objects. Programming the system to analyze a graphic *artistically* (using Entity Type Set A) is possible. Likewise, it would also be possible for it to be able to associate one graphic with idea modules that would retrieve art objects based on the modules. It would, however, be near impossible for the system to analyze the contextual facet of the graphical input and equally as difficult for it to activate idea module on those terms.

7 Conclusory Remarks

Perhaps a glaring artistic omission from this inspirational ISAR is music. Though the mathematical analysis of music has been all but mastered, I neglected to include it in the structure of this ISAR. I did this for the sake of simplicity and I chose images over music because I thought that choice would make a more interesting system to design.

For this project, I did not take resource limitations into consideration. Of course, the vast amount of cataloging that would be necessary to program the system to associate certain objects with certain words in term of both facets would be cost prohibitive for most institutions. Moreover, catalogers would need to be art experts.
The most important issue involved in the design of such an ISAR as this is the question of whether the process will work at all. It would require much trial and error. It is possible that we need to know more about the creative processes of specific users before attempting to inspire them to create art using such a system.