Gamification of Video Classification

M. Tech. Project Stage 1 Report

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by

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Contents

Abstract

The main objective is to optimize the game called "tagVideo", a Game With A Purpose(GWAP) that collects tags of videos to better understand videos and how people go about tagging.When people play the game they help determine the contents of videos by providing meaningful labels for them.Rather than using computer vision techniques to get the categories for videos, which dont work well enough, we encourage people to do the work by taking advantage of their desire to be entertained.

The major application of tagVideo game is that collected tags can help provide more effective searches, intuitive navigation, and data for training video classification models.

1   Introduction

There are large number of video collection and they present major technological challenge to classify them. There are no proper guide lines to provide textual description for videos, but yet this information is very much essential for major applications like video search engines.To make this manul process more enjoyable we introduce a game with a purpose(GWAP) called "**tagVideo**" .

1.1   tagVideo game

tagVideo is a game that lets you tag interesting videos. You can also view these videos on YouTube to gain knowledge.And for the tags entered, player can see the scores for each tag which motivates him/her to give more related tags.

Figure 1: tagVideo game

After the player finishes the game, he/she will be shown the leaderboard where rankings of all the players are displayed.This can be seen in Figure 2
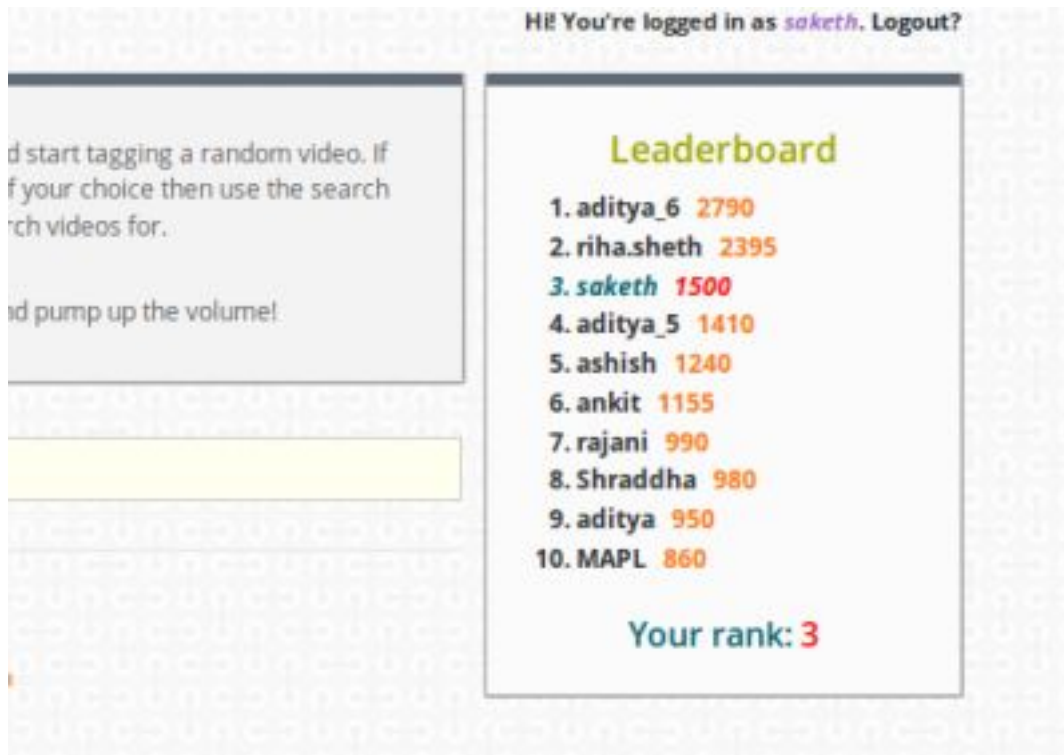

Figure 2: Leaderboard displaying scores

2 Related Work

2.1 ESP Game[1]

ESP(Extra Sensory Perception) game is a similar game that allows users to tag images. This game is played by 2 partners and meant to be played online by large number of pairs at once. Partners are randomly assigned and do not know each other. The only thing they have in common is the image that they tag.

    Goal :

From the player's perspective the goal of the ESP game is to guess what their partner is typing. Once they type the same string, then they move on to next image. They need not enter the tag at same time, but each must type the same string at some point while the image is on the screen.Please see Figure 3 for understanding this scenario.

Figure 3: partners agreeing on an image

    Taboo words are the words that the player is not allowed to enter as guesses. Initially an image will have no taboo words.When it is used for second time, it will have one taboo word obtained from agreement on that image from previous game and so on.Please see Figure 4 that displays taboo words of ESP game.

The rationale behind these taboo words is that often the initial labels agreed upon for an image are the most general ones (like man or picture), and by ruling those out the players will enter guesses that are more specific. Additionally, taboo words guarantee that each image will get many different labels associated with it.

Figure 4: Thermometer measures number of images agreed

The differences between current existing ESP game and our tagVideo game is depicted in the following table.

ESP game	tagVideo game
Tags Images	Tags Videos
Atleast two players must be online at the same time	No restriction
Single game is for 2.5 minutes	No restriction on time
Score is given only for common entered tag	Score is given for all tags(if related to video)

Table 1: Comparison of ESP and tagVideo games

3 IBM Watson services used in the game

3.1 Concept Insights[2]

Concept Insights service is used to explore information based on the concepts in the input, rather than limiting finding to traditional text matching. For example, if we search by entering the input as **_disaster_**, then the concept insights service not only gives the output that contains the word "disaster" but also terms like **_Earthquake_**, **_Drought and Famine_**, **_Hurricane_** and so on.

API Overview :
Concepts Insights service consists of 3 inter-connected end points.

- Accounts end point

- Graph end point

- Corpora end point

3.1.1 Accounts end point

This allows user to retrieve concept insights identification information.This information can be used from other APIs to allow users to create and name their own resources.

3.1.2 Graph end point

This is the main end point whose functions are used in the tagVideo game.This allows user to navigate and explore concept insights knowledge graph. The functions of this end point that are used in the tagVideo game are:

1. **label_search**
   Searches concepts in a concept graph looking for partial matches on the concept label field. The comparison is not case sensitive. When the prefix parameter is set to true, the main use of this method is to build query boxes that offer auto-complete, to allow users to select valid concepts.

   Input parameters

   - Text that indicates concept to be searched for.
   - prefix if set to true, works as auto complete feature.
   - limit, that indicates number of suggestions to be shown in ouput.(In game, it is set to 6)

   Output parameters

   - JSON Array of different senses that are related to input concept.

   Example

   Input : scie

   Output:

   1. Science
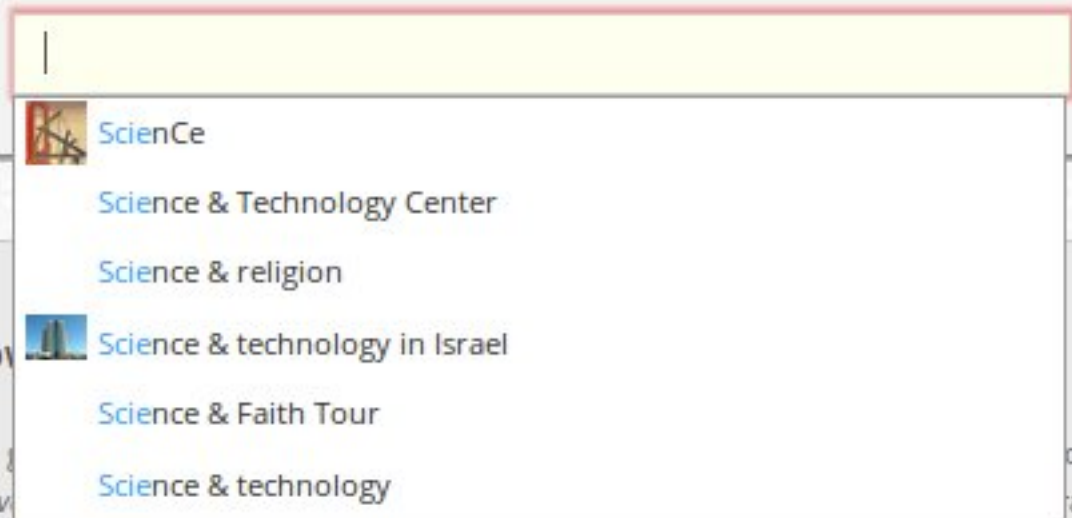   2. Science & Technology center

Figure 5: Label_search function used with prefix set to true

3. Science & religion
4. Science & technology in Israel
5. Science & Faith tour
6. Science & technology

This can be depicted in the Figure 5.

Where it is used in the game?
This function is used in 2 places in the tagVideo game.

1) While searching for videos that has to be selected to start playing the game with.
2) While entering the tags,to get auto suggestions on fly for the entered tag.

2. **related_concepts**
Retrieve concepts that are related (in conceptual sense) to a given concept or set of concepts. The method returns an array of Concepts. Each entry is augmented with a score field, which is a probability (value between 0.5 and 1.0) of the query concept being related to the concept in the returned entry.

Input parameters

- Array of concepts.
- level parameter.

The level parameter is an important option for this method. It allows the caller to choose the level of abstraction (or popularity) of the returned concepts. Values of 0 indicate very popular concepts (sometimes, they are also high level) concepts, such as countries, institutions, celebrities and subject areas. Values of 1-3 indicate increasingly less well known concepts that are likely to be related to fewer and fewer other concepts, and are more domain-specific concepts.

Output parameters

- JSON Array of suggested concepts

Example

Input: Farming,Irrigation,Food,Crops

Output:

Level 0: Irrigation,Food,Agriculture,Soil,Groundwater
Level 1:Sustainable agriculture,Food security,List of sustainable agriculture topics, Index of soil related articles,Tillage,Soil science,Permaculture
Level 2:International water management institute
Good agricultural practices
Environmental impact of agriculture
Agricultural productivity

Where it is used in the game?
Right now this function is not used in the game. But as a future extension, This has to be used

1) To suggest additional tags to the player based on the tags he had already entered.

3.1.3   Corpora end point

This allows users to upload their own set of documents into concept insights service. The provided documents are annotated and indexed by the service automatically. The query methods of this end point allows users to access the index created and analysis regarding the documents.

The following table gives the sample input and outputs for related_concepts function for various values of level parameter.

INPUT	Level 0	Level 1	Level 2
Farming,Irrigation,Food,Crops	Irrigation,Food,Agriculture,Soil,Groundwater	Sustainable_agriculture,Food_security,List_of_sustainable_agriculture_topics, Index_of_soil_related_articles, Tillage,Soil_science,Permaculture	International_water_management_institute,Good_agricultural_practices ,Environmental_impact_of_aagriculture,Agricultural_productivity
Drought,Famine,Disaster	Drought,Famine,Communes_of_niger, Groundwater,VDM_publsihing	List_of_famines,Drought,Famine,Food_security, Disaster,Water_crisis,Natural_disaster,Peak_oil	Centre_for_Research_on_the_Epidemiology_of_Disasters, Natural_hazard,List_of_famines,1931_China_floods, Natural_disasters_in_China,Famine_scales,ECB_Project, Soil_retrogression_and_degradation
Transport,Saw,Automobile,Wheel,Cloud	List_of_discontinued_Volkswagen_Group_petrol_engines, List_of_Volkswagen_Group_petrol_engines, Torque,Timeline_of_motor_vehicle_brands, Automatic_transmission	List_of_discontinued_Volkswagen_Group_petrol_engines, List_of_discontinued_Volkswagen_Group_diesel_engines, List_of_Volkswagen_Group_petrol_engines, List_of_Volkswagen_Group_diesel_engines, Motive_power,Crankshaft,Steering,Cylinder_block, Cylinder_head,Crankcase	Ball_joint,Lug_nut,Rolling,Spiral_bevel_gear, Main_bearing,Roller_chain,Hydraulic_tappet, Lift_table,Valvetrain, List_of_discontinued_Volkswagen_Group_petrol_engines
Saw,Croquet,Power tool,Hand tool,Leaf	Torque,List_of_discontinued_Volkswagen_Group_petrol_engines, Electric_motor,List_of_Volkswagen_Group_petrol_engines,Wood	Hammer,Saw,Drill_bit,Chisel,Drill,Milling_machine, Woodworking,Machine_tool,Lathe,Chainsaw	Workbench_(woodworking),Mallet, Handle_(grip),Bevel, Hammer,Drawknife,Woodworking_tools_manufacturers, Power_tool,Woodworking_machine, Drawer_(furniture)
Christmas,Tree,Saw,Herb,Herbal,Containers	Herb,Plastic,Tree,Christmas,Flora	List_of_culinary_herbs_and_spices,Herb, Chinese_herbology,Nail_(fastener), Kitchen_garden,Cumin,List_of_plants_in_The_English_Physitian_(1652_book),	Saigon_Cinnamon,Urticales,John_Uri_Lloyd,Chrozophora, Eclectic_medicine,Nine_Herbs_Charm,Stachys_officinalis, Elecampane,List_of_culinary_herbs_and_spices, Agathosma

4 Implementation Done

4.1 Reducing Latency By Disabling AutoSuggestions

Previously in the game, when the user enters a tag, auto suggestions are shown and he/she has to wait until the suggestions are shown and then select the appropriate tag for the video. Now, this latency is reduced by disabling auto sugegstions featute and after the user completes entering a tag, he/she has to press enter. Then automatically the word is mapped to its first suggestion and score is assigned to that tag on the fly.

4.1.1 Advantages

- User need not wait for the sugegstions to be shown

- He/she can completely concentrate on providing tags, rather than changing the tag until suggestions are shown

4.1.2 Disadvantages

- Sometimes the first suggestion may not be the appropriate one with reference to the video.

  For example, if the user enters the tag "social", the first suggestion it gets mapped to is the word "facebook", which may not always be the appropraite tag for given video.

  This problem has to be solved by mapping the user entered tag to the most meaningful suggestion(semantically) rather than the first suggestion.

4.2 SpellCheck using Mashape[3]

Mashape[3] is an open source webspell checker service that provides suggestions for spelling corrections for specified text.

Previously in the game, while entering a tag, user had choosen from one of the suggestions shown by concept insights service. So there is no need of spell checker. But now, as the auto suggestion feature is disabled there may be possibility that the user misspells a word and hence the necessity of correcting it arises. If we do not correct the misspelled word, it cannot be mapped to any word in the concept insights service corpus and hence this tag cannot be shown in Leaderboard.

4.3 Suggesting tags

Based on the tags the player had entered, and using **related_concepts** function of concept insights service of IBM Watson some additional tags are suggested.

4.4 User stories
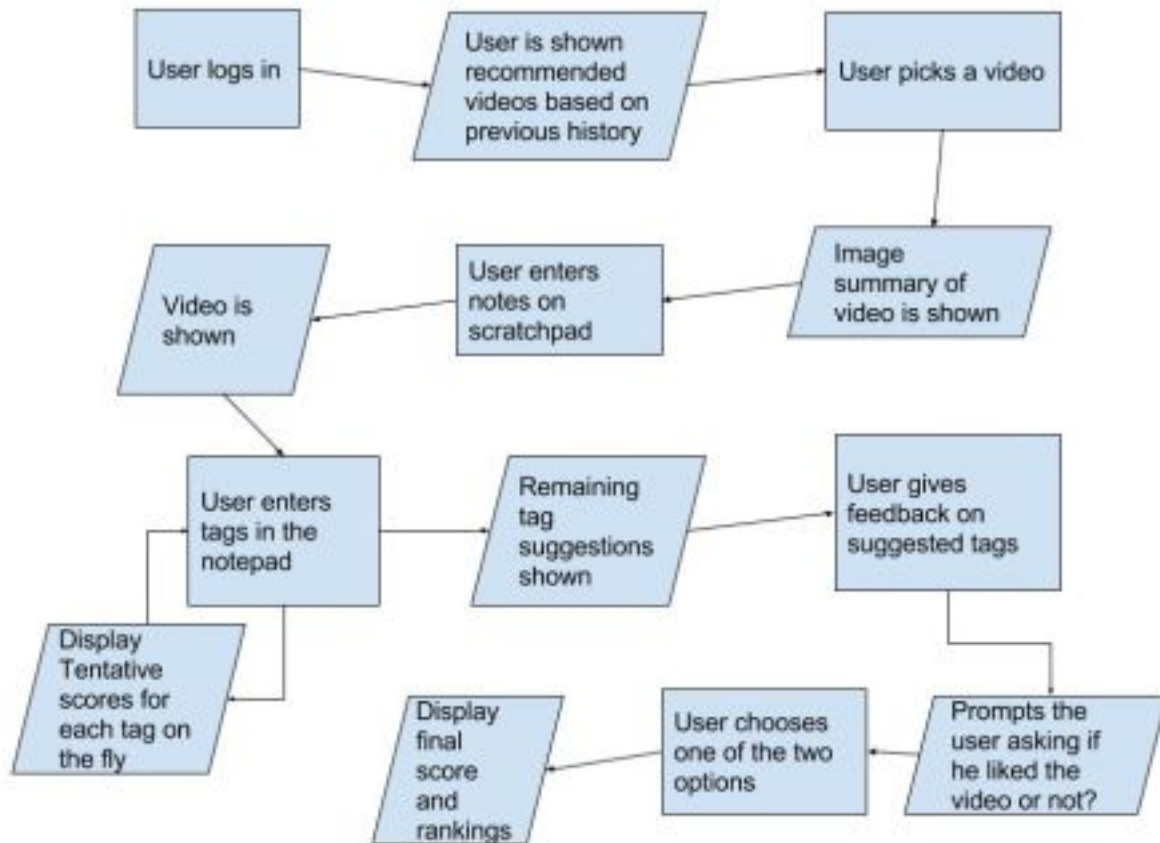
4.4.1 User story for entire tagVideo game

Figure 6: User story for entire tagVideo game
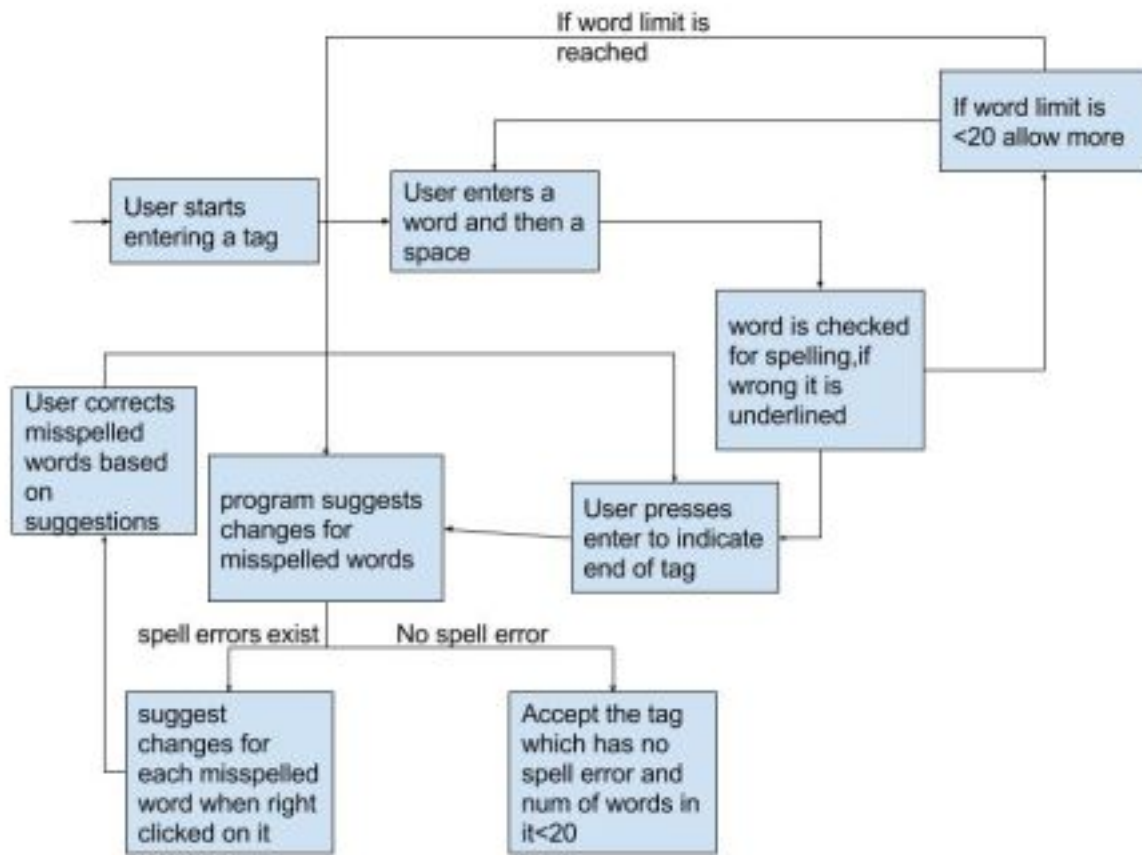
4.4.2 User story for entering tags

Figure 7: User story for entering tags

5   Conclusion

The first step in optimizing game is to remove restriction on user to enter only concepts given by concept insights service .In this process, we reduced the latency by removing auto suggestions and making user enter his own rich set of tags.When user enters his own tags, there might be possibility of spell erros and hence spell check has been integrated.

6 Future Scope

6.1 Major Challenges to Overcome

Removing the dependency on IBM Watson corpus and building our own domain specific knowledge graph of categories.

6.2 Work in stage 2

The following major tasks are planned to be done in stage 2:

- Recommend videos to the user based on the viewing history.

- Flashing of the image summary of the video, before the user sees the entire video

- Implementation of asking user's feedback on tags entered by other playes, at the end of viewing the video.

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References

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[2] https://watson-api-explorer.mybluemix.net/swagger.html?url=/listings/concept-insights-v2.json , [Online; accessed 08-October-2015].

[3] https://market.mashape.com/montanaflynn/spellcheck, [Online; accessed 02-October-2015].