DETECTING OBJECT OPEN ANGLE AND DIRECTION USING MACHINE LEARNING

SK. Kavin [1], Dr.E .Mohanraj [2]

[1] Student, Department of Computer Science and Engineering, K.S.Ranagasamy College of Technology, Namakkal, India

[2] Associate Professor, Department of Computer Science and Engineering, K.S.Ranagasamy College of Technology, Namakkal, India

ABSTRACT

Detecting visually salient regions in pictures is prime issues. salient object regions may be a soft decomposition of foreground and background image parts. To observe salient regions in a picture in terms of prominence map. to form prominence map by mistreatment linear combination of colours in High dimensional color area. to enhance the performance of prominence estimation ,utilize the relative location and color distinction between super pixels. To resolve the prominence estimation from trimap by mistreatment learning based mostly formula. to form 3 bench mark datasets it's economical as compared with previous state of art prominence estimation strategies.This is supported Associate in Nursing observation that salient regions typically have distinctive colors compared with backgrounds in human perception, however, human perception is difficult and extremely nonlinear. By mapping the low-dimensional red, green, and blue color to a feature vector in an exceedingly high-dimensional color area, I tend to show that we will composite Associate in Nursing correct prominence map by finding the optimum linear combination of color coefficients within the high-dimensional color area.

However, whereas several such models exist. prominence detection has gained tons of attention in image process. In past few years several prominence detection ways are planned. This paper presents varied prominence detection ways To any improve the performance of my prominence estimation, our second key plan is to utilize relative location and color distinction between super pixels as options and to resolve the prominence estimation from a trimap via a learning-based formula. the extra native options and learning-based formula complement the world estimation from the high-dimensional color transform-based formula. The experimental results on 3 benchmark datasets show that my approach is effective as compared with the previous progressive prominence estimation ways.

KEYWORD : *Salient Region, Object Detecting, Machine Learning.*

1. INTRODUCTION

1.1 SALIENT REGION DETECTION

Identifying visually salient regions is beneficial in applications like object primarily based image retrieval, adaptational content delivery adaptational region-of-interest primarily based compression, and sensible image resizing. I tend to determine salient regions as those regions of a picture that area unit visually a lot of conspicuous by virtue of their distinction with relevancy close regions. Similar definitions of salience exist in literature wherever salience in pictures is observed as native distinction.

Method for locating salient regions uses a distinction determination filter that operates at numerous scales to come up with salience maps containing "saliency values" per picture element. Combined, these individual maps lead to our final salience map. we tend to demonstrate the employment of the ultimate salience map in segmenting whole objects with the help of a comparatively straightforward segmentation technique. The novelty of our approach lies find top quality salience maps of constant size and backbone because the input image and their use in segmenting whole objects. the strategy is effective on a large vary of pictures as well as those of paintings, video frames, and pictures containing noise

Salient region detection is very important in image understanding and analysis. Its goal is to discover salient regions in a picture in terms of a salience map, wherever the detected regions would draw humans' attention. several previous studies have shown that salient region detection is beneficial, and it's been applied to several applications as well as segmentation, seeing, image retargetting, image

transcription, image quality assessment, image thumbnailing and video compression. the most approaches as follow as:

- Salient region choice is shapely because the facility location downside, that is solved by increasing a submodular objective operate. This provides a brand new perspective victimisation submodularity for salient region detection, and it achieves state-of-art performance on 2 public salience detection benchmarks.
- The similarities between hypothesized region centers and their region parts area unit developed as a labeling downside on the vertices of a graph. it's solved by finding a harmonic operate on the graph, that encompasses a closed-form answer.
- I gift Associate in Nursing economical greedy algorithmic rule by victimisation the submodularity property of the target operate.
- I naturally integrate high-level priors with low-level salience into a unified framework for salient region detection.

SUPERPIXEL

Superpixel map has several desired properties:

- It is computationally efficient: it reduces the quality of pictures from many thousands of pixels to solely a number of hundred superpixels.
- It is also representationally efficient: pairwise constraints between units, whereas just for adjacent pixels on the pixel-grid, will currently model a lot of longer-range interactions between superpixels.
- The superpixels are percetually meaningful: every superpixel may be a perceptually consistent unit, i.e. all pixels in a very superpixel square measure possibly uniform in, say, color and texture.
- It is near-complete: as a result of superpixels square measure results

of Associate in Nursing over segmentation, most structures within the image is preserved. there's little or no loss in moving from the pixel-grid to the superpixel map.

It is really not novel to use superpixels or atomic regions to hurry up later-stage visual processing; the concept has been round the community for a moment.

(1) To empirically validate the completeness of superpixel maps

(2) to use it to unravel difficult vision issues such as finding individuals in static pictures.

1.2 TRIMAP SEGMENTATION

Digital matting consists in extracting a foreground part from the background. normal strategies ar initialized with a trimap, a partition of the image into 3 regions: a certain foreground, a certain background, and a alloyed region wherever pixels ar thought-about as a combination of foreground and background colours. convalescent these colours and also the proportion of mixture between each is Associate in Nursing under-constrained inverse drawback, sensitive to its initialization: one needs to specify Associate in Nursing correct trimap, deed undetermined as few pixels as potential. First, I have a tendency to propose a replacement segmentation theme to extract Associate in Nursing correct trimap from simply a rough indication of some background and/or foreground pixels.

Standard applied mathematics models are used for the foreground and also the background, whereas a particular one is meant for the alloyed region. The segmentation of the 3 regions is conducted at the same time by Associate in Nursing repetitive Graph Cut primarily based optimisation theme. This easy trimap is comparable to rigorously hand given ones. As a second step, we have a tendency to make the most of our alloyed region model to style Associate in Nursing improved matting methodology coherent. supported international statistics instead of on native ones, our methodology is far quicker than normal Bayesian matting, while not quality loss, and conjointly usable with manual trimaps.

1.3 RANDOM FORESTS

A random forest multi-way classifier consists of variety of trees, with every tree fully grown mistreatment some kind of organisation. The leaf nodes of every tree square measure tagged by estimates of the posterior distribution over the image categories. every internal node contains a check that best splits the house of knowledge to be classified. a picture is classed by causing it down each tree and aggregating the reached leaf distributions. Randomness are often injected at 2 points throughout coaching: in subsampling the training knowledge so every tree is fully grown employing a completely different subset; and in choosing the node tests

An image is delineated mistreatment the spatial scheme planned by Lazebnik et al, that is predicated on spatial pyramid matching, however here applied to each look and form. The illustration is illustrated.

Appearance. SIFT descriptors square measure computed at points on an everyday grid with spacing M pixels. At every grid purpose the descriptors square measure computed over four circular support patches with completely different radii, consequently every purpose is delineated by four SIFT descriptors. Multiple descriptors square measure computed to permit for scale variation between pictures. The dense options square measure vector quantal into V visual words mistreatment K-means agglomeration.

Shape. native form is delineated by a bar chart of edge orientations gradients inside a picture subregion quantal into K bins. every bin within the bar chart represents the amount of edges that have orientations inside an exact angular vary. This illustration are often compared to the normal "bag of (visual) words", wherever here every visual word may be a quantisation nervy orientations.

In order to grasp however random forests works it's necessary to become accustomed to call trees. call trees square measure prognosticative models that use a group of binary rules to calculate a target worth. 2 forms of call trees square measure classification trees and regression trees. Classification trees square measure accustomed produce categorical knowledge sets like land cowl classification and regression trees square measure accustomed produce continuous knowledge sets like biomass and p.c tree cowl.

Random forests, like call trees, are often accustomed solve classification and regression issues however it's able to overcome the drawbacks related to single call trees whereas maintaining the advantages. The random forests model calculates a response variable (e.g., land cover, p.c tree cover) by making several (usually many hundred) completely different call trees (the forest of trees) then putt every object to be sculpturesque (in our case the item may be a multi-layered pixel) down every of the choice trees. The response is then determined by evaluating the responses from all of the trees. within the case of categoryification the category that's foretold most is that the class that's allotted for that object.In different words, if five hundred trees square measure fully grown and four hundred of them predict that a specific element is forest and a hundred predict it's grass the expected output for that element are going to be forest. within the case of regression the ensuing worth for Associate in Nursing object is that the mean of all of the predictions. Since predictions from random forests square measure derived employing a forest of trees it's inconceivable to simply illustrate however the predictions square measure created. let's say the method it'd be necessary to draw all of the trees for every prediction which might end in many call tree diagrams for every model.

The key to the success of random forests is however it creates every of the choice trees that form up the forest. There square measure 2 steps involving random choice that square measure used once forming the trees within the forest. the primary step involves indiscriminately choosing, with replacement, knowledge from equipped coaching areas to make every tree. for every tree a special set of the coaching knowledge square measure accustomed develop the choice tree model and also the remaining simple fraction of the coaching knowledge square measure accustomed check the accuracy of the model. The sample knowledge used for testing square measure usually referred to as the "out-of-bag" samples. The second sampling step is employed to work out the split conditions for every node within the tree. At every node within the tree a set of the predictor variables is indiscriminately selected to form the binary rule.

When running random forests there square measure variety of parameters that require to be fixed. the foremost common parameters:

- Input coaching knowledge as well as predictor variables like image bands and digital elevation models and response variables like land cowl sort and biomass

- The range of trees that ought to be designed
- The range of predictor variables to be accustomed produce the binary rule for every split
- Parameters to calculate info associated with error and variable significance.

2.LITERATURE REVIEW

2.1 SLIC SUPERPIXELS COMPARED TO STATE-OF-THE-ART SUPERPIXEL METHODS

R. Achanta, A. Shaji, al., [1] has planned superpixels have become progressively fashionable to be used in laptop vision applications. However, there ar few algorithms that output a desired range of normal, compact superpixels with an occasional procedure overhead. I tend to introduce a unique formula that clusters pixels within the combined 5 dimensional color and image plane area to expeditiously generate compact, nearly uniform superpixels. The simplicity of our approach makes it very simple to use a lone parameter specifies the quantity of superpixels and also the potency of the formula makes it terribly sensible. Experiments show that our approach produces superpixels at a lower procedure value whereas achieving a segmentation quality up to or bigger than four progressive ways, as measured by boundary recall and under-segmentation error. I tend to additionally demonstrate the advantages of our superpixel approach in distinction to existing ways for 2 tasks during which superpixels have already been shown to extend performance over pixel-based ways.

My approach generates superpixels by agglomeration pixels supported their color similarity and proximity within the image plane. this is often exhausted the five-dimensional [labxy] area, wherever [lab] is that the constituent color vector in CIELAB color area, that is wide thought of as perceptually uniform for little color distances, and sex chromosome is that the constituent position. whereas the utmost doable distance between 2 colours within the CIELAB area (assuming s RGB input images) is restricted, the spatial distance within the sex chromosome plane depends on the image size. it's unacceptable to easily use the geometer distance during this 5D area while not normalizing the spatial distances. so as to cluster pixels during this 5D area, I tend to thus introduce a replacement distance live that considers superpixel size. Using it, we tend to enforce color similarity moreover as constituent proximity during this 5D area specified the expected cluster sizes and their spatial extent ar around equal.

Superpixels offer a convenient primitive from that to reason native image options. They capture redundancy within the image and greatly cut back the quality of resultant image process tasks. they need evidenced progressively helpful for applications like depth estimation, image segmentation, skeletonization, body model estimation and object localization. For superpixels to be helpful they need to be quick, simple to use, and turn out top quality segmentations. sadly, most progressive superpixel ways don't meet of these necessities. As i'll demonstrate, they usually super from a high procedure value, poor quality segmentation, inconsistent size and form, or contain multiple difficult-to-tune parameters.

2.2 HIGH-DIMENSIONAL COLOR TRANSFORM FOR SALIENCY DETECTION

J. Kim, D. Han,al., [2] has planned to introduce a completely unique technique to mechanically sight salient regions of a picture via highdimensional color remodel. My main plan is to represent a strikingness map of a picture as a linear combination of high-dimensional color area wherever salient regions and backgrounds are often distinctively separated. this is {often|this can be} supported AN observation that salient regions often have distinctive colours compared to the background in human perception, however human perception is usually sophisticated and extremely nonlinear. By mapping an occasional dimensional RGB color to a feature vector during a high-dimensional color area,.I tend to show that are able to linearly separate the salient regions from the background by finding AN best linear combination of color coefficients within the high-dimensional color area. Our high dimensional color area incorporates multiple color representations as well as RGB, CIELab, HSV and with gamma corrections to complement its representative power. Our experimental results on 3 benchmark datasets show that our technique is effective, and it's computationally economical compared to previous progressive techniques.

I exploring the ability of various color area representations, we tend to propose high-dimensional color remodel that maps an occasional dimensional RGB color tuple into a high-dimensional feature vector. Our high dimensional color remodel combines many representative color areas like RGB, CIELab,

HSV, beside totally different gamma corrections to complement the representative power of our high-dimensional color remodel area. ranging from a couple of initial color samples of detected salient regions and backgrounds, our technique estimates AN best linear combination of color values within the high-dimensional color remodel area that ends up in a per-pixel strikingness map. As incontestable in my experimental results, our per-pixel strikingness map represents however distinctive the colour of salient regions is compared to the colour of the background. Note that a straightforward linear combination or transformation of the colour area cannot deliver the goods results almost like me.

Assumptions Since our technique uses solely color info to separate salient regions from the background, our technique shares a limitation once identically-colored objects area unit gift in each the salient regions and therefore the background. In such cases, utilizing high-level options, like texture, is that the solely thanks to resolve this ambiguity. withal, I tend to show that several salient regions will merely be detected victimisation solely color info via our highdimensional color remodel area, and that we deliver the goods high detection accuracy and higher performance compared with several previous strategies that utilizes multiple high-level options.

2.3 SALIENT OBJECT DETECTION

A. Borji, M.-M. Cheng al.,[3] has planned detective work and segmenting salient objects in natural scenes, usually aforesaid as salient object detection, has attracted many interest in laptop computer vision. whereas many models ar planned and a number of {other|and several other} other applications have emerged, withal a deep understanding of achievements and issues is lacking. we've an inclination to aim to produce a comprehensive review of the recent progress in salient object detection and situate this field among different closely connected areas like generic scene segmentation, object proposal generation, and strikingness for fixation prediction. Covering 228 publications, we've an inclination to survey i) roots, key ideas, and tasks, ii) core techniques and main modeling trends, and iii) datasets and analysis metrics in salient object detection. I an inclination to to boot discuss open problems like analysis metrics and dataset bias in model performance and advocate future analysis directions.

Humans area unit able to sight visually distinctive, so called salient, scene regions effortlessly and chop-chop (i.e., pre-attentive stage). These filtered regions area unit then perceived and processed in finer details for the extraction of richer high-level information (i.e., attentive stage). This capability has long been studied by psychological feature scientists and has recently attracted many interest within the laptop computer vision community within the main as a results of it helps understand the objects or regions that expeditiously represent a scene and then harness advanced vision problems like scene understanding. Some topics that area unit closely or remotely related to visual strikingness include: salient object detection, fixation prediction, object importance, memorability, scene muddle, video interest, surprise, image quality assessment, scene normality, aesthetic and attributes. Given house limitations, this paper cannot completely explore all the said analysis directions. Instead, we've an inclination to entirely target salient object detection, a search house that has been greatly developed among the past twenty years especially since 2007.

2.4 OBJECT DETECTION: A BENCHMARK

A. Borji, M.-M. Cheng al.,[4] has projected many salient object detection approaches are revealed that are assessed victimisation totally different analysis scores and datasets leading to discrepancy in model comparison. This requires a method framework to check existing models and valuate their professionals and cons. we have a tendency to analyze benchmark datasets and grading techniques and, for the primary time, offer a quantitative comparison of thirty five state of the art prominence detection models. I discover that some models perform systematically higher than the others. prominence models that will predict eye fixations perform lower on segmentation datasets compared to salient object detection algorithms. Further, we have a tendency to propose combined models that show that integration of the few best models outperforms all models over different datasets. By analyzing the consistency among the most effective models and among humans for every scene, we have a tendency to establish the scenes wherever models or humans fail to notice the foremost salient object. I have a tendency to highlight this problems and propose future analysis directions.

Recently, salient object detection has attracted plenty of interest in laptop vision because it provides quick solutions to many advanced processes. Firstly, it detects the foremost salient and attention-grabbing object during a scene, so it segments the entire extent of that object. The output typically could be a map wherever the intensity of every constituent represents the chance of that constituent happiness to the salient object. This drawback in its essence could be a segmentation drawback

however slightly differs from the standard general image segmentation. whereas salient object detection models section solely the salient foreground object from the background, general segmentation algorithms partition a picture into regions of coherent properties. Salient object detection strategies additionally disagree from different prominence models that aim to predict scene locations wherever a personality's observer might fixate. Since prominence models, whether or not they address segmentation or fixation prediction, each generate prominence maps; they're interchangeably applicable.

To the authors' best information, such try for benchmarking salient object segmentation strategies has not been reportable. sadly, these strategies have usually been evaluated on totally different datasets, that in some cases area unit tiny and not simply accessible. the dearth of revealed benchmarks causes discrepancy in quantitative comparison of competitive models. Not solely will a benchmark enable researchers to check their models with different algorithms, however it additionally helps establish the chief factors touching performance. this might lead to a fair quicker performance improvement.

2.5 ATTENTIONAL MODULATION OF HUMAN PATTERN DISCRIMINATION PSYCHOPHYSICS REPRODUCED BY A QUANTITATIVE MODEL

Laurent Itti, Jochen Braun al.,[5] has projected antecedently projected a quantitative model of early visual process in primates, supported non-linearly interacting visual filters and statistically economical call. I have a tendency to currently use this model to interpret the determined modulation of a variety of human psychophysical thresholds with and while not focal visual attention. Our model - tag by AN automatic fitting procedure - at the same time reproduces thresholds for four classical pattern discrimination tasks, performed whereas attention was engaged by another synchronal task. My model then predicts that the ostensibly complicated enhancements of sure thresholds, that I have a tendency to determined once attention was totally out there for the discrimination tasks, will best be explained by a strengthening of competition among early visual filters. At the premise of our results is that the hypothesis that spotlight may modulate the sooner instead of the later stages of visual process. we have a tendency to found that a awfully easy, prototypic, task-independent sweetening of the number of competition between early visual filters accounts well for the human knowledge. This sweetening resulted from will increase in parameters 'Y and five within the model, and was paralleled by a rise in distinction gain and a sharpening in orientation standardisation. though it's unacceptable from our knowledge to rule out any basic cognitive process modulation at later stages, our hypothesis has recently received experimental support that spotlight so modulates early visual process in humans.

More psychophysical experiments square measure required to analyze basic cognitive process modulation at later process stages. for instance, it would be doable to review the impact of attention on {the call|the choice} stage by manipulating attention throughout experiments involving decision uncertainty. within the absence of such results, I tried in my experiments to reduce the doable impact of attention on later stages, by exploitation solely easy stimulation patterns destitute of abstract or emotional that means, like to involve as very little as doable the additional psychological feature stages of visual process. I am finding that spotlight might increase the number of competition between early visual filters is amid AN sweetening of the gain and sensitivity of the filters, and by a sharpening of their standardisation properties. The existence of 2 such process states - one, additional sensitive and selective within the main focus of attention, and also the alternative, additional broadly-tuned and non-specific outside - are often even by a minimum of 2 observations: 1st, the upper level of activity in attended neurons consumes additional energy, which can not be fascinating over the complete extent of visual cortices. Second, though less economical for fine discriminations, the broadly-tuned and non-specific state might have larger ability at catching surprising, non-specific visual events. during this perspective, this state would be fascinating as AN input to bottom-up, visual alerting mechanisms, that monitor the remainder of our visual world whereas we have a tendency to square measure specializing in a particular task requiring high focal accuracy.

3.EXISTING SYSTEM

My work belongs to the active analysis field of visual attention modeling, that a comprehensive discussion is on the far side the scope of this paper. we have a tendency to refer readers to recent survey papers for a close discussion of sixty five models, similarly as measure of various ways within the 2 major analysis directions: human fixation prediction and salience object detection. I have a

tendency to specialise in relevant literature targeting pre attentive bottom-up salience region detection, that square measure biologically impelled, or strictly process, or involve each aspects. Such ways utilize low level process to see the distinction of image regions to their surroundings, and use feature attributes like intensity, colour, and edges . I have a tendency to broadly speaking classify the algorithms into native and world schemes. Note that the classification isn't strict as a number of the analysis efforts are often listed below each classes. native distinction primarily based ways investigate the rarity of image regions with relevancy (small) native neighborhoods. This work a bottom-up visual salience model to normalize the feature maps of Itti et al. to spotlight conspicuous components and allow combination with alternative importance maps. The model is straightforward, biologically plausible, and simple to put to multi-scale distinction by linearly combining distinction during a mathematician image pyramid. additional recently at the same time model native low-level clues, world concerns, visual organization rules, and high level options to spotlight salient objects together with their contexts. Such ways victimization native distinction tend to supply higher salience values close to edges rather than uniformly light salient objects.The average salience values inside image segments created by mean-shift segmentation, so realize salient objects by characteristic image segments that have average salience on top of a threshold that's set to be double the mean salience worth of the complete image. we have a tendency to propose a unique approach that extends GrabCut technique and mechanically initialize it victimization our salience detection ways. Experiments on our ten, 000 pictures dataset (see Sec. 6.1.1) demonstrate the numerous benefits of our technique compared to alternative progressive ways.

4.PROPOSED SYSTEM

A new framework for salience computation supported spectral domain is planned during this paper. The formula uses the band-pass filtering in Fourier rework (FT) domain with many bandwidths which will represent attentive regions on the image. the upper the information measure the additional texture level salience is found, and with the smaller bandwidths at higher frequency edges or corners is detected on the image. texture representations area unit given higher weights to make uniformity on the detected salient regions.

Algorithm 1. The pseudo-code for the proposed algorithm.

Input: the input image I, the initial level set function $\phi 0$.

Initialization:

1: Initialization the Fourier level set function according to Equation (20).

2: Initialize the related parameters: $\sigma=4,\tau=0.02$.

Repeat:

3: For 1 to T do

4: Compute Magnitude using Fourier external function with Equation (21).

5: Compute Fourier force function on Equation (22).

6: Update the level set function according to Equation (23).

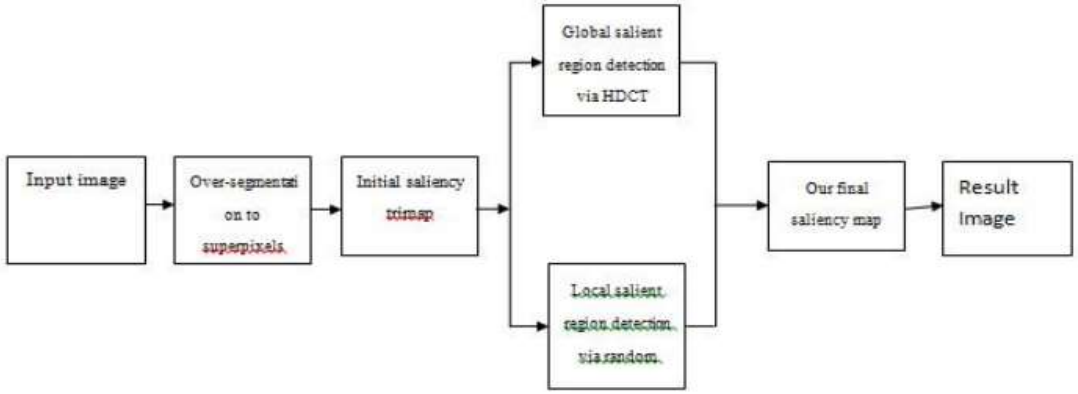
7: end for

8: If converge

9: end

10: **Output**: The resultant salient object $\phi=\phi T$.

OVERALL SYSTEM FLOW DIAGRAM



5.RESULT AND DISCUSSION

In addition to the colour house and coefficient parameter analysis, the planned model was additionally compare to many state of the art algorithms to demonstrate the effectiveness of salient regions obtained from frequency domain selected band-pass regions. For the comparison strikingness models IT , MZ, SR, and foot models selected . These models were selected thanks to the actual fact that they embody either center-surround distinction, contrast, or frequency domain based mostly approaches that were compatible with the planned model.

In, strikingness maps square measure given for the compared models and planned formula with CIE laboratory color house and coefficient case 2 of since CIE laboratory color house could be a wide used color conversion formula to demonstrate the experimental results of the strikingness outputs offers the AUC performance of the state of the art models from one thousand image dataset.

It are often seen that planned model all told cases outdo the prevailing algorithms concerning the AUC values. planned formula has the simplest strikingness performance concerning the AUC values with all color house and coefficient conditions with relevance compared state of the art algorithms. strikingness model foot planned has the rival AUC performance, that even have high sensory activity quality and uses CIE laboratory color house conversion. On the opposite hand, AUC performances of IT (i.e. abstraction domain model with multi-scale center-surround analysis) and ST (i.e. supported frequency domain analysis to search out irregularities) have terribly shut AUC values in average performance. The model MZ in has the bottom strikingness performance among the compared models.

6. CONCLUSION

A simple and economical prominence detection model was introduced that generates salient feature maps from band-pass regions by utilizing Fourier rework. Therefore, the model will acquire attentive regions that represents edge to textural salient regions from the colour image by yielding full resolution prominence maps with high sensory activity quality. Salient feature maps were combined in an exceedingly weighted manner wherever the one with a lot of frequency content, representing the salient texture information, had a lot of impact on the ultimate prominence.

I showed that frequency domain may be wont to attain band-pass regions to calculate prominence map by outperforming standard prominence computation models. Also, experimental analysis disclosed that the suitable color house model choice may be useful to the results of the prominence computation.

As a future work, weight of the feature maps may be optimized supported the frequency content, and also, information measure region and size choice in frequency domain may be improved victimization image similarity in an exceedingly top-down manner to extend the performance of the planned model.

7..FUTURE WORK

Detection of salient regions in pictures is beneficial for object based mostly image retrieval and browsing applications. This task are often done exploitation strategies supported the human visual attention model, wherever feature maps similar to color, intensity and orientation capture the corresponding salient regions. during this paper, I tend to propose a technique for combining the salient regions from the individual feature maps supported a new Composite strikingness Indicator (CSI) which measures the contribution of every feature map to strikingness. the strategy conjointly carries out a dynamic coefficient of individual feature maps. The experiment results indicate that this mixture strategy reflects the salient regions in a picture additional accurately

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