# INVALIDITY CONTENTIONS FOR U.S. 7,542,610

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| 1. A method for enabling selection of image content items, the method comprising: | Section 2.1: Applications of Content-based Retrieval<br>"There is a broad class of methods and systems aimed at browsing through a large set of images from unspecified sources."<br><br>Also in earlier prior art: *Frankel et al.*<br>"This paper describes WebSeer, a system for locating images on the Web. WebSeer uses image content in addition to associated text to index images, presenting the user with a selection that potentially fits her needs." |
| using a processor to performs steps comprising: | Section 1: Introduction<br>"We adopt patterns of use and patterns of computation as the leading principles of our review. We follow the data as they flow through the computational processes and consider alternative processes with the same position in the flow (Fig. 2)."<br><br>Fig. 2: "Basic algorithmic components of query by pictorial example …" |
| performing image analysis on a collection of image content items to obtain information about each image content item; | Section 1: Introduction<br>"Then, description of content is analyzed in two steps. First, in Section 3, image processing methods by color, texture, and local shape are discussed. They serve as a preprocessing step to the partitioning of the data array and the computation of features, as discussed in Section 4."<br><br>Section 3: Description of Content: Image Processing<br>"So, the purpose of image processing in image retrieval must be to enhance aspects in the image data relevant to the query and to reduce remaining aspects."<br><br>Section 4: Description of Content: Features<br>"... condense the pictorial information into feature values" |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| wherein performing image analysis includes (i) identifying one or more objects in individual image content items, | Section 3: Description of Content: Image Processing<br>"The aim of invariant descriptions is to identify objects, no matter from how and where they are observed."<br><br>Section 3.1: Color Image Processing<br>"a nonparametric cluster algorithm in RGB-space is used to identify which pixels in the image originate from one uniformly colored object."<br><br>Section 3.2: Image Processing for Local Shape<br>"Combining shape and color both in invariant fashion …to identify objects."<br><br>Section 4.1: Grouping Data<br>"a division of the image data into regions in such a way that region *T* contains the pixels of the silhouette of object *O* in the real world and nothing else." |
| (ii) determining a category of each identified object, the category of each object being one of a plurality of possible object categories; | Section 2.4: Use and User, the Semantic Gap<br>"a program that explores the Internet, collecting images and inserting them in a predefined taxonomy"<br><br>Section 5.7: Learning an Interpretation<br>"In [186] preliminary work is reported towards automatic detection of categories"<br><br>Section 6.4: Interacting with Query Space<br>"The system in [111] precomputes a hierarchical grouping of partitionings (or images for that matter) based on the similarity for each individual feature… For category and target search, a system may refine the likelihood of a particular interpretation, updating the label based on feature values or on similarity values."<br><br>Also in earlier prior art: *Frankel et al.*<br>"Image analysis algorithms are then used to classify the image within a taxonomy of types … and to extract useful semantic information" |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| (iii) identifying a set of features that are specific to the determined category of the identified object in each image content item, | Section 2.3: Domain Knowledge<br>"Category-based rules encode the characteristics common to class z of the space of all notions Z. If z is the class of all teapots, the characteristics include the presence of a spout... each application domain has a private set of constraints."<br>“The domain knowledge may take the form of further constraints to the literal image qualities, additional physical or geometrical laws, or domain-specific man-made customs."<br><br>Section 5.7: Learning an Interpretation<br>"In [176], a very large number of precomputed features is considered, of which a small subset is selected by boosting [80] to learn the image class."<br><br>Section 6.2: Query Specification<br>"the system then selects an appropriate algorithm for segmenting the image and extracting the domain-dependent features."<br><br>Fig. 8: “The different types of features …”<br>Fig. 9: “Illustration of the various feature types …” |
| and (iv) determining information based on the set of features for the determined category that characterizes the identified object, the information characterizing the object to be separately identifiable from at least some other identified objects in the determined category; | Section 4: Description of Content: Features<br>"... condense the pictorial information into feature values"<br><br>Section 4.2: Global and Accumulating Features<br>"A histogram may be effective for retrieval as long as there is a uniqueness in the color pattern held against the pattern in the rest of the entire data set ... A different view on accumulative features is to demand that all information (or all relevant information) in the image is preserved in the feature values."<br><br>Section 4.3: Salient Features<br>“As the information of the image is condensed into just a limited number of feature values, the information should be selected with precision for greatest saliency and proven robustness.” |
| storing the information obtained from the image analysis in one or more data stores; | Fig. 2: "Store in I-file"; "Store in F-file"<br><br>Section 7.1: Storage and Indexing<br>"We have been concerned with the content of the image eventually leading to a feature vector ... containing the information of the image. Repetition over all images in the data set yields a file of feature vectors, the data file." |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| identifying one or more criteria determined from a text or image content provided in connection with either a user or programmatically identified input; and | Section 6.1: Query Space: Definition and Initialization<br>"Under all circumstances, however, the user should be capable of indicating the class of features relevant for the task, like shape, texture, or both… The appropriate features can then be automatically selected by the system."<br><br>Section 6.2: Query Specification<br>"For specifying a query *q* in *Q*, many different interaction methodologies have been proposed."<br>The whole of Section 6.2 is concerned with various search criteria.<br><br>Section 8: Concluding Remarks<br>"Information about an image can come from a number of different sources: the image content, labels attached to the image, images embedded in a text, and so on."<br><br>Fig. 11: "Example queries for each of the six different query types…" |
| performing a search operation to identify one or more image content items that satisfy the one or more criteria of the input using the stored information in the one or more data stores; | Fig. 2: shows stored feature information being accessed to compute similarity<br><br>Section 6.2: Query Specification<br>"exact query, where the query answer set A(q) equals the images in $I_Q$ , satisfying a set of given criteria"<br><br>Section 7.1: Storage and Indexing<br>"…we discussed the request as translated into the query image vector, $F_q$ , to be compared with the elements $F_d$ of data file on the basis of the similarity function." |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| wherein at least some of the collection of image content items correspond to images of merchandise objects; | Section 2.3: Domain Knowledge<br>"Category-based rules encode the characteristics common to class z of the space of all notions Z. If z is the class of all teapots, the characteristics include the presence of a spout... each application domain has a private set of constraints."<br><br>Moreover, it was well known to apply CBIR techniques to merchandise. At the very least, it would have been obvious to combine this reference with prior art such as *Aigrain et al.* to apply to images of merchandise objects:<br>"Examples of such applications are where visual appearance (e.g., color, texture, shape, motion) are important search arguments like in stock photo/video, art, retail, on-line shopping etc."<br><br>Or, as already implemented in prior art in *Gangopadhyay*, which applies CBIR (of which well-known techniques which were summarized in *Smeulders et al.*one year prior) to merchandise:<br>"The methodology we describe in this paper utilizes visual information, which is an important characteristic for many products such as apparel, designer costumes, interior designs of homes and automobiles, and landscaping."<br>"… this is one of the first applications of CBIR in the domain of electronic commerce in general and electronic retailing in particular." |
| wherein performing the search operation includes selecting one or more image content items of merchandise objects for display with a document in response to said input specifying a merchandise object in the document; | Section 6.3: Query Space Display<br>"When the query is exact, the result of the query is a set of images fulfilling the predicate… For approximate queries, the images in $I_Q$ are given a similarity ranking based on $S_Q$ with respect to the query."<br><br>See also *Gangopadhyay*:<br>"The applications module is a Web-based system for interacting with end-users..."<br>"Once the user has selected a certain item, and intends to examine it in more detail, an enlarged image is displayed on the right side of the screen… The user can then request for other pieces of apparels that will match with the one selected, or other pieces of apparel that are similar to the one selected, based on shape, color, and texture features." |
| wherein selecting one or more images of merchandise objects for display with the document includes selecting the one or more images based on a determination that the one or more images of merchandise objects are similar to the specified merchandise object; | Section 6.2: Query Specification<br>The subsection on *approximate query by image example* describes selection of a set of images based on a determination of similarity to a specified image.<br><br>See also *Gangopadhyay*:<br>"The user can then request for other pieces of apparels that will match with the one selected, or other pieces of apparel that are similar to the one selected, based on shape, color, and texture features." |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| providing a link with each of the selected one or more images of the merchandise objects, wherein the link is selectable to enable a user to purchase the merchandise objects from a network site operated by the merchant. | It was well known to use links to merchandise objects for any applications involving merchandise searching.<br><br>It would have been obvious to combine this reference with prior art such as *Aigrain et al.* to apply to merchandise objects:<br>"Examples of such applications are where visual appearance (e.g., color, texture, shape, motion) are important search arguments like in stock photo/video, art, retail, on-line shopping etc." |
| | |
| 2. The method of claim 1, wherein performing image analysis is performed programmatically and prior to identifying one or more criteria. | Fig. 2,6,7,8: shows programmatic data-flow schemes for image analysis, which occurs prior to query (identifying one or more criteria)<br><br>Section 7.2: System Architectures<br>"a clear distinction can be made between off-line indexing and online readout for retrieval." |
| | |
| 3. The method of claim 1, wherein storing the information includes storing the information in web based index that also associates information about each image content item with a location of the image content item. | Section 7.2: System Architectures<br>"numerous Web search engines, where the emphasis is on filling the database using the World Wide Web as a logical repository. Architectural issues focus on modules for searching the Web. In such architectures, a clear distinction can be made between off-line indexing and online readout for retrieval."<br><br>Also in earlier prior art: *Frankel et al.*<br>Page 9 shows a table of "the fields which Webseer currently saves for each image", including a field for the image's File Name and the Source URL of the webpage in which it appears. |
| | |
| 4. The method of claim 1, wherein identifying one or more criteria includes programmatically analyzing a web document that is identified in the input to determine the one or more criteria from one or both of a text portion or image portion of the web document; and wherein the method further comprises presenting the identified one or more image content items to the user. | Section 8: Concluding Remarks<br>"Information about an image can come from a number of different sources: the image content, labels attached to the image, images embedded in a text, and so on."<br><br>*Quack et al.*<br>Page 1: "We present Cortina, a large-scale image retrieval system for the WWW. It handles over 3 million images to date. The system retrieves images based on visual features and collateral text. We show that a search process which consists of an initial query-by-keyword or query-by-image and followed by relevance feedback on the visual appearance of the results is possible for large-scale data sets."<br><br>*Frankel at al.*<br>Page 2: "WebSeer uses the textual information surrounding an image and the image header to supplement the information derived from analyzing the image content. This additional information is used to create a context in which image analysis algorithms can effectively operate." |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| | |
| 5. The method of claim 1, identifying one or more criteria includes: detecting an image content item that is selected or being viewed by the user; identifying text data associated with the image content item; and forming at least a portion of the one or more criteria based on the text data associated with the image content item | Section 8: Concluding Remarks<br>"Information about an image can come from a number of different sources: the image content, labels attached to the image, images embedded in a text, and so on."<br><br>*Quack et al.*<br>Page 1: "We present Cortina, a large-scale image retrieval system for the WWW. It handles over 3 million images to date. The system retrieves images based on visual features and collateral text. We show that a search process which consists of an initial query-by-keyword or query-by-image and followed by relevance feedback on the visual appearance of the results is possible for large-scale data sets."<br><br>*Frankel at al.*<br>Page 2: "WebSeer uses the textual information surrounding an image and the image header to supplement the information derived from analyzing the image content. This additional information is used to create a context in which image analysis algorithms can effectively operate." |
| | |
| 6. The method of claim 1, wherein identifying one or more criteria includes: detecting an input image content item from a web document; | Fig 12: shows that the input image is derived from query specification<br><br>Section 6.2: Query Specification<br>"Approximate query by image example feeds the system a complete array of pixels"<br><br>Also, in earlier prior art: *Frankel, et al.*<br>"Information for finding images on the World Wide Web can come from two sources: the relevant text and the image itself. Using information from both sources, a program should be able to successfully retrieve requested images."<br>"An HTML document is a structured document. Understanding the structure of a particular document can reveal valuable information about the images contained on that page. There are several places relevant information about image content may be located within the document." |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| identifying a given object of the input image content item, including a corresponding category of the given object, the corresponding category being associated with a specific set of features; | Section 6.4: Interacting with Query Space<br>"images displayed correspond to a partitioning of $I_Q$ . By selecting an image, one of the sets in the partition is selected and the set $I_Q$ is reduced. Thus, the user zooms in on a target or a category."<br>"In current systems, the feature vectors in $F_Q$ corresponding to images in $I_Q$ are assumed fixed."<br><br>Section 2.3: Domain Knowledge<br>"Category-based rules encode the characteristics common to class z of the space of all notions Z. If z is the class of all teapots, the characteristics include the presence of a spout... each application domain has a private set of constraints."<br><br>Section 6.2: Query Specification<br>"the system then selects an appropriate algorithm for segmenting the image and extracting the domain-dependent features." |
| determining a signature value of the object in the input image content item based on a characterization of one or more features in the specific set of features for the corresponding category of the identified object; | Section 6.2: Query Specification<br>"the system then selects an appropriate algorithm for segmenting the image and extracting the domain-dependent features."<br><br>Section 2.3: Domain Knowledge<br>"Category-based rules encode the characteristics common to class z of the space of all notions Z. If z is the class of all teapots, the characteristics include the presence of a spout... each application domain has a private set of constraints."<br>"The domain knowledge may take the form of further constraints to the literal image qualities, additional physical or geometrical laws, or domain-specific man-made customs."<br><br>Section 5.1: Semantic Interpretation<br>"Weak semantics aims at encoding, in a simple and approximate way, a subset of the possible interpretations of an image that are of interest in a given application." |
| forming at least one of the criteria from the signature value of the input image content item. | Fig 2 shows that the computed features are included in "content of query"<br><br>Section 5.2: Similarity between Features<br>"While searching for a query image $i_q(x)$ among the elements of the data set of images, $i_d(x)$, knowledge of the domain will be expressed by formulating a similarity measure $S_{q,d}$ between the images $q$ and $d$ on the basis of some feature set. The similarity measure depends on the type of features…" |
| | |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| 7. The method of claim 6, wherein performing image analysis on individual image content items in the collection by determining information based on the set of features for the determined category that characterizes the identified object includes determining a signature value for the identified object, the signature value being based at least in part on a quantitative characterization of at least some features in the set of features for the determined category of the identified object; and | Section 5.2: Similarity between Features<br>"While searching for a query image $i_q(x)$ among the elements of the data set of images, $i_d(x)$, knowledge of the domain will be expressed by formulating a similarity measure $S_{q,d}$ between the images $q$ and $d$ on the basis of some feature set. The similarity measure depends on the type of features…"<br><br>Section 4.2: Global and Accumulating Features<br>"As proper querying for similarity is based on a suitable distance function between images, the transform has to be applied on a metric space." |
| performing a search operation to identify one or more image content items that includes using the signature of the one or more criteria to perform a similarity comparison with a signature value of other objects identified from image content items in the collection. | Section 5: Interpretation and Similarity<br>Section 5 discusses quantitative characterizations of features that can be used to compute similarity between objects.<br><br>Section 7.1: Storage and Indexing<br>"…we discussed the request as translated into the query image vector, $F_q$ , to be compared with the elements $F_d$ of data file on the basis of the similarity function." |
| | |
| 8. The method of claim 1, wherein at least some of the collection of image content items correspond to advertisement media, and wherein performing a search operation to identify one or more image content items includes selecting one or more advertisement media from the collection for display with a web document that is presented to the user. | *Barsness, et al.*<br>Page 1: "The present invention provides an apparatus, method and program product for analyzing a digital image for consumer identifying characteristics, and generating advertisements specifically to the consumer based on the identifying characteristics of the digital image. The analysis of the digital image may involve object recognition, text recognition and/or metadata analysis of a selected digital image." |
| | |
| 9. The method of claim 8, wherein selecting one or more advertisement media is performed in response to the user making a selection of a particular content on the web document. | *Barsness, et al.*<br>Page 1: "The present invention provides an apparatus, method and program product for analyzing a digital image for consumer identifying characteristics, and generating advertisements specifically to the consumer based on the identifying characteristics of the digital image. The analysis of the digital image may involve object recognition, text recognition and/or metadata analysis of a selected digital image." |
| | |
| 10. The method of claim 8, wherein selecting one or more advertisement media is performed in response to detecting the text or image content provided in the web document. | *Barsness, et al.*<br>Page 7: "The analysis of the selected digital image for one or more consumer identifying characteristics can be performed in several ways. In one embodiment, the analysis is done by performing object recognition of at least one defined object within the selected digital image. In another embodiment, the analysis is done by performing text recognition within the selected digital image. In yet another embodiment, the analysis is done by reading metadata associated with the selected digital image." |
| | |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| 11. The method of claim 1, wherein performing a search operation includes configuring the search operation based on a category of the one or more criteria. | Section 6.2: Query Specification<br>"*Exact query by group predicate* is a query using an element $z \in Z_Q$ is a set of categories … the user queries on a hierarchical taxonomy of categories." |
| | |
| 12. The method of claim 11, wherein configuring the search operation includes weighting how the one or more criteria compare to one or more corresponding features in the set of features for the category of the search. | Section 6.1: Query Space: Definition and Initialization<br>"The user should also select a similarity function, $S_q$. To adapt to different data sets and goals, $S_q$ should be a parameterized function. Commonly, the parameters are weights for the different features." |
| | |
| 13. The method of claim 1, wherein: performing image analysis includes identifying one or more apparel items in each image content item, | This reference describes identification of objects in image content items:<br><br>Section 3: Description of Content: Image Processing<br>"The aim of invariant descriptions is to identify objects, no matter from how and where they are observed."<br><br>Section 3.1: Color Image Processing<br>"a nonparametric cluster algorithm in RGB-space is used to identify which pixels in the image originate from one uniformly colored object."<br><br>Section 3.2: Image Processing for Local Shape<br>"Combining shape and color both in invariant fashion …to identify objects."<br><br>Section 4.1: Grouping Data<br>"a division of the image data into regions in such a way that region *T* contains the pixels of the silhouette of object *O* in the real world and nothing else."<br><br>It would have been obvious to combine this reference with prior art in *Gangopadhyay (2001)* to apply to objects that are apparel items:<br>"The methodology we describe in this paper utilizes visual information, which is an important characteristic for many products such as apparel, designer costumes, …"<br>"We describe a prototype system in the context of the apparel industry."<br>"The methodology is presented in the context of an apparel retailer selling men's wear such as dress shirts, trousers, sports jackets, sweaters, and shoes." |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| determining the category of the object identified in each image content item includes identifying a category of the apparel item | This reference describes identification of categories of objects identified in image content items:<br><br>Section 2.4: Use and User, the Semantic Gap<br>"a program that explores the Internet, collecting images and inserting them in a predefined taxonomy"<br><br>Also in earlier prior art: *Frankel et al.*<br>"Image analysis algorithms are then used to classify the image within a taxonomy of types … and to extract useful semantic information"<br><br>It would have been obvious to combine this reference with prior art in *Gangopadhyay (2001)* to apply to objects that are apparel items:<br>"The methodology we describe in this paper utilizes visual information, which is an important characteristic for many products such as apparel, designer costumes, …"<br>"We describe a prototype system in the context of the apparel industry."<br>"The methodology is presented in the context of an apparel retailer selling men's wear such as dress shirts, trousers, sports jackets, sweaters, and shoes." |
| | |
| 14. The method of claim 13, wherein identifying the set of features that are specific to the determined category includes identifying a buckle or zipper for one or more apparel items. | Section 2.3: Domain Knowledge<br>"Category-based rules encode the characteristics common to class z of the space of all notions Z. If z is the class of all teapots, the characteristics include the presence of a spout... each application domain has a private set of constraints."<br><br>It would have been obvious to combine this reference with prior art in *Gangopadhyay (2001)* to apply to objects that are apparel items:<br>Abstract:<br>"We describe a prototype system in the context of the apparel industry."<br><br>Section 3: Methodology<br>"The methodology is presented in the context of an apparel retailer selling men's wear such as dress shirts, trousers, sports jackets, sweaters, and shoes." |
| | |
| 15. A computer system that operates to enable selection of image content items, the computer system comprising: | Section 2.1: Applications of Content-based Retrieval<br>"There is a broad class of methods and systems aimed at browsing through a large set of images from unspecified sources."<br><br>Also in earlier prior art: *Frankel et al.*<br>"This paper describes WebSeer, a system for locating images on the Web. WebSeer uses image content in addition to associated text to index images, presenting the user with a selection that potentially fits her needs." |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| an image analysis sub-system that is configured to analyze individual image content items that form part of a collection of image content items, the image analysis sub-system being configured to | Section 1: Introduction<br>"Then, description of content is analyzed in two steps. First, in Section 3, image processing methods by color, texture, and local shape are discussed. They serve as a preprocessing step to the partitioning of the data array and the computation of features, as discussed in Section 4."<br><br>Section 3: Description of Content: Image Processing<br>"So, the purpose of image processing in image retrieval must be to enhance aspects in the image data relevant to the query and to reduce remaining aspects."<br><br>Section 4: Description of Content: Features<br>"... condense the pictorial information into feature values" |
| (i) identify one or more objects from individual image content items, | Section 3: Description of Content: Image Processing<br>"The aim of invariant descriptions is to identify objects, no matter from how and where they are observed."<br><br>Section 3.1: Color Image Processing<br>"a nonparametric cluster algorithm in RGB-space is used to identify which pixels in the image originate from one uniformly colored object."<br><br>Section 3.2: Image Processing for Local Shape<br>"Combining shape and color both in invariant fashion …to identify objects."<br><br>Section 4.1: Grouping Data<br>"a division of the image data into regions in such a way that region *T* contains the pixels of the silhouette of object *O* in the real world and nothing else." |
| (ii) determine one or more of a plurality of categories for each identified object, | Section 2.4: Use and User, the Semantic Gap<br>"a program that explores the Internet, collecting images and inserting them in a predefined taxonomy"<br><br>Section 5.7: Learning an Interpretation<br>"In [186] preliminary work is reported towards automatic detection of categories"<br><br>Section 6.4: Interacting with Query Space<br>"The system in [111] precomputes a hierarchical grouping of partitionings (or images for that matter) based on the similarity for each individual feature… For category and target search, a system may refine the likelihood of a particular interpretation, updating the label based on feature values or on similarity values."<br><br>Also in earlier prior art: *Frankel et al.*<br>"Image analysis algorithms are then used to classify the image within a taxonomy of types … and to extract useful semantic information" |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| (iii) associate a set of features that are specific to each of the plurality of categories, so that each category is assigned a set of features that are different from the set of features for at least some of the other categories; | Section 2.3: Domain Knowledge<br>"Category-based rules encode the characteristics common to class z of the space of all notions Z. If z is the class of all teapots, the characteristics include the presence of a spout... each application domain has a private set of constraints."<br>"The domain knowledge may take the form of further constraints to the literal image qualities, additional physical or geometrical laws, or domain-specific man-made customs."<br><br>Section 5.7: Learning an Interpretation<br>"In [176], a very large number of precomputed features is considered, of which a small subset is selected by boosting [80] to learn the image class."<br><br>Section 6.2: Query Specification<br>"the system then selects an appropriate algorithm for segmenting the image and extracting the domain-dependent features."<br><br>Fig. 8: "The different types of features …"<br>Fig. 9: "Illustration of the various feature types …" |
| wherein for each identified object, the image analysis sub-system is configured to determine a signature value for the object by characterizing individual features in the set of features that are specific to the category of the identified object; | Section 4: Description of Content: Features<br>"... condense the pictorial information into feature values"<br><br>Section 4.2: Global and Accumulating Features<br>"A histogram may be effective for retrieval as long as there is a uniqueness in the color pattern held against the pattern in the rest of the entire data set ... A different view on accumulative features is to demand that all information (or all relevant information) in the image is preserved in the feature values."<br><br>Section 4.3: Salient Features<br>"As the information of the image is condensed into just a limited number of feature values, the information should be selected with precision for greatest saliency and proven robustness." |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| a search component that is configured to (i) identify, from an input that specifies or includes an image, a given object and a corresponding category of the given object, | Section 3: Description of Content: Image Processing<br>"The aim of invariant descriptions is to identify objects, no matter from how and where they are observed."<br><br>Section 3.1: Color Image Processing<br>"a nonparametric cluster algorithm in RGB-space is used to identify which pixels in the image originate from one uniformly colored object."<br><br>Section 3.2: Image Processing for Local Shape<br>"Combining shape and color both in invariant fashion …to identify objects."<br><br>Section 4.1: Grouping Data<br>"a division of the image data into regions in such a way that region *T* contains the pixels of the silhouette of object *O* in the real world and nothing else."<br><br>Section 2.4: Use and User, the Semantic Gap<br>"a program that explores the Internet, collecting images and inserting them in a predefined taxonomy"<br><br>Section 5.7: Learning an Interpretation<br>"In [186] preliminary work is reported towards automatic detection of categories"<br><br>Section 6.4: Interacting with Query Space<br>"The system in [111] precomputes a hierarchical grouping of partitionings (or images for that matter) based on the similarity for each individual feature… For category and target search, a system may refine the likelihood of a particular interpretation, updating the label based on feature values or on similarity values."<br><br>Also in earlier prior art: *Frankel et al.*<br>"Image analysis algorithms are then used to classify the image within a taxonomy of types … and to extract useful semantic information" |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| (ii) determine a criteria from the image of the input, wherein the criteria is based at least in part on a specific set of features that are associated with the corresponding category of the object identified from the object in the image of the input, and | Section 2.3: Domain Knowledge<br>"Category-based rules encode the characteristics common to class z of the space of all notions Z. If z is the class of all teapots, the characteristics include the presence of a spout... each application domain has a private set of constraints."<br>"The domain knowledge may take the form of further constraints to the literal image qualities, additional physical or geometrical laws, or domain-specific man-made customs."<br><br>Section 5.7: Learning an Interpretation<br>"In [176], a very large number of precomputed features is considered, of which a small subset is selected by boosting [80] to learn the image class."<br><br>Section 6.1: Query Space: Definition and Initialization<br>"Under all circumstances, however, the user should be capable of indicating the class of features relevant for the task, like shape, texture, or both… The appropriate features can then be automatically selected by the system."<br><br>Section 6.2: Query Specification<br>"For specifying a query *q* in *Q*, many different interaction methodologies have been proposed."<br>The whole of Section 6.2 is concerned with various search criteria.<br><br>Fig. 11: "Example queries for each of the six different query types…" |
| (iii) use the signature value determined for each identified object in the collection to select one or more image content items from the collection that satisfies the criteria; | Fig. 2: shows stored feature information being accessed to compute similarity<br><br>Section 6.2: Query Specification<br>"exact query, where the query answer set A(q) equals the images in $I_Q$ , satisfying a set of given criteria"<br><br>Section 7.1: Storage and Indexing<br>"…we discussed the request as translated into the query image vector, $F_q$ , to be compared with the elements $F_d$ of data file on the basis of the similarity function." |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| wherein at least some of the collection of image content items correspond to images of merchandise objects; | Section 2.3: Domain Knowledge<br>"Category-based rules encode the characteristics common to class z of the space of all notions Z. If z is the class of all teapots, the characteristics include the presence of a spout... each application domain has a private set of constraints."<br><br>Moreover, it was well known to apply CBIR techniques to merchandise. At the very least, it would have been obvious to combine this reference with prior art such as *Aigrain et al.* to apply to images of merchandise objects:<br>"Examples of such applications are where visual appearance (e.g., color, texture, shape, motion) are important search arguments like in stock photo/video, art, retail, on-line shopping etc."<br><br>Or, as already implemented in prior art in *Gangopadhyay*, which applies CBIR (of which well-known techniques which were summarized in *Smeulders et al.*one year prior) to merchandise:<br>"The methodology we describe in this paper utilizes visual information, which is an important characteristic for many products such as apparel, designer costumes, interior designs of homes and automobiles, and landscaping."<br>"… this is one of the first applications of CBIR in the domain of electronic commerce in general and electronic retailing in particular." |
| wherein the search component is configured to: select one or more image content items of merchandise objects for display with a document in response to said input specifying a merchandise object in the document, the one or more images being selected based on a determination that the one or more images of merchandise objects are similar to the specified merchandise object; | Section 6.2: Query Specification<br>The subsection on *approximate query by image example* describes selection of a set of images based on a determination of similarity to a specified image.<br><br>See also *Gangopadhyay*:<br>"The applications module is a Web-based system for interacting with end-users..."<br>"Once the user has selected a certain item, and intends to examine it in more detail, an enlarged image is displayed on the right side of the screen… The user can then request for other pieces of apparels that will match with the one selected, or other pieces of apparel that are similar to the one selected, based on shape, color, and texture features."<br>"The user can then request for other pieces of apparels that will match with the one selected, or other pieces of apparel that are similar to the one selected, based on shape, color, and texture features." |
| provide a link with each of the selected one or more images of the merchandise objects, wherein the link is selectable to enable a user to purchase the merchandise objects from a network site operated by the merchant. | It was well known to use links to merchandise objects for any applications involving merchandise searching.<br><br>It would have been obvious to combine this reference with prior art such as *Aigrain et al.* to apply to merchandise objects:<br>"Examples of such applications are where visual appearance (e.g., color, texture, shape, motion) are important search arguments like in stock photo/video, art, retail, on-line shopping etc." |
| | |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| 16. The computer system of claim 15, further comprising: a data store that stores information that identifies or corresponds to each image content item in the collection, and for each image content item, the signature value of one or more objects identified from each image content item in the collection. | Fig. 2: "Store in I-file"; "Store in F-file"<br><br>Section 7.1: Storage and Indexing<br>"We have been concerned with the content of the image eventually leading to a feature vector ... containing the information of the image. Repetition over all images in the data set yields a file of feature vectors, the data file." |
| | |
| 17. The computer system of claim 15, wherein the image analysis sub-system is configured to identify anyone of a plurality of apparel items as the object in individual image content items that form at least a portion of the collection. | Section 5: Interpretation and Similarity discusses object identification and similarity in detail.<br><br>It would have been obvious to combine this reference with prior art in *Gangopadhyay (2001)* to apply to objects that are apparel items:<br>Abstract:<br>"We describe a prototype system in the context of the apparel industry."<br><br>Section 3: Methodology<br>"The methodology is presented in the context of an apparel retailer selling men's wear such as dress shirts, trousers, sports jackets, sweaters, and shoes." |
| | |
| 18. The computer system of claim 17, wherein the set of features for an item of apparel includes a shape of the apparel item at a specific region of the object. | Sections 4.5 and 5.3 discuss shape features.<br><br>Section 4.5: Shape and Object Features<br>"An abundant comparison of shape for retrieval can be found in [109], evaluating many features on a 500-element trademark data set."<br><br>*Gangopadhyay (2001)*<br>Section 4.2: Characterizing visual features<br>"The visual features of an object can be characterized by shape, distribution of color, and texture. In the context of apparel, shapes can be used to characterize printed patterns. We use two parameters to characterize shape: surface regularity and roundness. In addition, it is also possible to specify relative locations and topologies of smaller component shapes to create composite shapes."<br><br>Section 4.2.1. Characterization by shape<br>"Most real-life objects are irregular in shape, and hence there is no universal approach to quantify the shape of an arbitrarily shaped object. However, the shape of an object can be parameterized with the help of some measurable properties." |
| | |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| 19. The computer system of claim 17, wherein the set of features for an item of apparel includes a style of the apparel item. | 4.4: Signs<br>“When one of the possible interpretations of an image is so preponderant that it can be considered *the* meaning of the image, the image holds a sign.”<br>“Typical signs are an icon, a character, a traffic light, or a trademark.”<br>“Other systems based on signs are designed with specific application domains in mind, like OCR from an image, faces to detect from the image, medical images, textile, art, or detecting the constituent components of silhouettes of plants based on a visual lexicon.”<br><br>It would have been obvious to combine this reference with prior art in *Gangopadhyay (2001)* to apply to objects that are apparel items to extract style:<br>Abstract:<br>“We describe a prototype system in the context of the apparel industry.”<br><br>Section 3: Methodology<br>“The methodology is presented in the context of an apparel retailer selling men’s wear such as dress shirts, trousers, sports jackets, sweaters, and shoes.” |
| | |
| 20. The computer system of claim 17, wherein the set of features for an item of apparel includes at least one feature that indicates presence of a buckle, zipper or shoe heel. | Section 2.3: Domain Knowledge<br>"Category-based rules encode the characteristics common to class z of the space of all notions Z. If z is the class of all teapots, the characteristics include the presence of a spout... each application domain has a private set of constraints."<br><br>It would have been obvious to combine this reference with prior art in *Gangopadhyay (2001)* to apply to objects that are apparel items:<br>Abstract:<br>“We describe a prototype system in the context of the apparel industry.”<br><br>Section 3: Methodology<br>“The methodology is presented in the context of an apparel retailer selling men’s wear such as dress shirts, trousers, sports jackets, sweaters, and shoes.” |
| | |
| 21. The computer system of claim 15, wherein the input further includes a user selection to view a web page or resource. | Section 6.2: Query Specification<br>“A Web search system”<br><br>It would have been exceedingly well-known to include a Web URL in the input. |
| | |
| 22. The computer system of claim 21, wherein the one or more components include a component that supplement the web page or resource being viewed by the user with the selected one or more image content items. | Section 2.1: Applications of Content-based Retrieval<br>“searches for a picture to go with a broad story, searches to illustrate a document” |
| | |

| CLAIM LANGUAGE | DESCRIPTION IN SMEULDERS, ET AL. |
|---|---|
| 23. The computer system of claim 15, wherein the image analysis sub-system is configured to determine the signature value for each object of the individual image content items by quantitatively characterizing individual features in the set of features for the determined category of that object. | Section 8: Concluding Remarks<br>"segmentation leads to the calculation of salient features capturing the essential information of the object in a nutshell"<br><br>Section 4.3: Salient Features<br>"Salient feature calculations lead to sets of regions or points with known locations and feature values capturing their salience."<br><br>Section 3: Description of Content: Image Processing<br>"features may carry more object-specific information" |
| | |
| 24. The computer system of claim 15, wherein the search component operates to determine a signature value of the given object in the image of the input based on a characterization of one or more features in the specific set of features for the corresponding category of the given object. | Section 6.2: Query Specification<br>"A Web search system in which the user places icons representing categories"<br><br>Section 2.3: Domain Knowledge<br>"Category-based rules encode the characteristics common to class z of the space of all notions Z. If z is the class of all teapots, the characteristics include the presence of a spout... each application domain has a private set of constraints."<br>"The domain knowledge may take the form of further constraints to the literal image qualities, additional physical or geometrical laws, or domain-specific man-made customs."<br><br>Section 5.7: Learning an Interpretation<br>"In [176], a very large number of precomputed features is considered, of which a small subset is selected by boosting [80] to learn the image class."<br><br>Section 6.2: Query Specification<br>"the system then selects an appropriate algorithm for segmenting the image and extracting the domain-dependent features." |
| | |
| 25. The computer system of claim 24, wherein the search component operates to form at least one of the criteria from the signature value of the image of the input. | Section 6.2: Query Specification<br>The subsection on *approximate query by image example* describes selection of a set of images based on a determination of similarity to a specified image using its signature value.<br><br>See also *Gangopadhyay*:<br>"The user can then request for other pieces of apparels that will match with the one selected, or other pieces of apparel that are similar to the one selected, based on shape, color, and texture features." |