# EXHIBIT 4

UNITED STATES PATENT AND TRADEMARK OFFICE


BEFORE THE PATENT TRIAL AND APPEAL BOARD


Google Inc.
Petitioner

v.

Network-1 Technologies, Inc.
Patent Owner


Trial No:  Not Assigned
Patent No. 8,904,464


**DECLARATION OF PIERRE MOULIN**

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# Contents

automated systems to recognize audio, video, and/or image content by analyzing the intrinsic features of a video work.

16.    The second technology is at issue in this proceeding. Computer-automated systems for recognizing audio, video, and/or image content universally relied on two widely known technologies: feature extraction and neighbor searching in a database.

17.    Feature extraction refers to quantifying a media work in a form that—unlike a raw video feed—admits a compact representation and is easily parsed by a computer. Being compact means that they occupy less memory on a computer than the corresponding video file did. Furthermore, extracted features are typically structured in a format that facilitates efficient search. In the context of a content identification system, each set of extracted features corresponding to a given media work is stored as an entry in a database. Within such a database, entries are typically organized to facilitate efficient search. Such organization is sometimes known as "preprocessing."

18.    Neighbor searching refers to algorithms for comparing a first set of extracted features with one or more additional sets of extracted features to locate a close, but not necessarily exact, match. Because neighbor searching is computationally intensive for large feature sets, content recognition schemes typically employed search algorithms that increased efficiency by intelligently searching only a subset of potential matches (i.e., "non-exhaustive" algorithms).

example, early computers utilized primitive processors to generate data, and stored and retrieved data on punch cards, drum memory, or other primitive storage devices.

24. Based on my understanding, the only technical sounding feature in any of the claims – "correlating . . . using a non-exhaustive, near neighbor search," as recited in claims 1 and 18 – is not novel or unobvious.

25. I understand that the Patent Owner has argued that "non-exhaustive search" is defined as "search using an algorithm designed to locate a match without requiring the query to be compared to every record in the reference data set being searched until a match is identified." *See* Ex. 1004 at 3. I do not agree that this is the broadest reasonable definition of non-exhaustive. However, the analysis presented herein is valid under this narrow definition and any broader definition.

26. Non-exhaustive, near neighbor searches were well-known to those of skill in 2000. For example, a paper by Aristides Gionis, published in 1999 and entitled "Similarity Search in High Dimensions via Hashing," discusses a method for approximate similarity searching in high-dimensional data such as image and video databases, pattern recognition, and other data having a large number of relevant features. Ex. 1008 at 518. *Gionis* discloses preprocessing a set of objects ('P') "so as to efficiently answer queries by finding the point in P closest to a query point q." Ex. 1008 at 520.

27. *Gionis* contrasts its algorithm with those in the prior art by "introduc[ing] a new indexing method for approximate nearest neighbor." *Id.* at 519, col. 1, ¶ 3. The

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