Patent Analytics Project

1. **Project Overview**

   The US Patent & Trademark Office (USPTO) publishes new US patents at midnight Eastern time every Tuesday and pending Patent applications at midnight Eastern time every Thursday. While these patents and application publications are freely searchable, and even downloadable one at a time, by the public, I am not aware of any publicly accessible analytical tools that are freely useable by the public to analyze the patent information for the purpose of identifying trends and/or deriving insights from the patent data.

2. **Project Purpose**

   Provides a learning opportunity involving the use of digital technology, in particular currently available open source language models, to determine if they can be used to automate analysis and categorization of publicly available patent publication information from the USPTO with any meaningful level of accuracy.

3. **Project Objectives**
   a. Explore use of various language models to cluster published patent documents into broad categories based on Cooperative Patent Classification (CPC) symbols listed on the faces of the patent publications.
   b. Explore use of various language models to cluster published patent documents into broad categories based on textual contents of various sections of the patent documents.
   c. Explore use of various language models to refine the various clusters of the published patent documents into more specific categories based on the combinations of the CPC symbols and the textual contents of the published patent.
   d. Mine insights from the categorized patent publications with the help of visualization tools.

Cooperative Patent Classification (CPC) is the classification structure that the USPTO uses to assign patent documents both to generic and specific categories to make it easier for patent examiners to be able to search for and retrieve patent documents that contain information of interest. At the highest level of abstraction, the CPC scheme categorizes patent documents into 8 categories called sections. The CPC scheme are identified with the letters A to H, and Y as summarized below.

Section A – Human Necessities

Section B – Performing Operations; Transporting

Section C – Chemistry; Metallurgy

Section D – Textiles; Paper

Section E – Fixed Constructions

Section F – Mechanical Engineering; Lighting; Heating; Weapons; Blasting

Section G – Physics

Section H – Electricity

Section Y – New technological development, cross-sectional

Technologies

Each patent document can be assigned to one or more of these broad categories. It should be noted that the CPC scheme has a hierarchical structure with each of the 8 sections. The hierarchy has the following structure.

Sections

    Classes

        Subclasses

   **Groups**

                Subgroups

That is to say, a patent document is assigned: to a particular CPC scheme section, to a particular class within that section, to a subclass within the assigned class, and finally within a group or a subgroup of the subclass. Each of the section, class, subclass, group and subgroup is identified with a symbol that is composed of one or more combination of alphanumeric characters.

A symbol assigned to a patent document can theoretically include up to 15 alphanumeric characters.

A classification symbol has the following structure:

Value	A-H, Y	01 to 99		A…Z	1 to 9999				/	00 to 999999					
Content	section	class	class	subclass	main group	main group	main group	main group	slash	subgroup	subgroup	subgroup	subgroup	subgroup	subgroup
Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

For example, the symbol A01B0001/00 has the following structure.
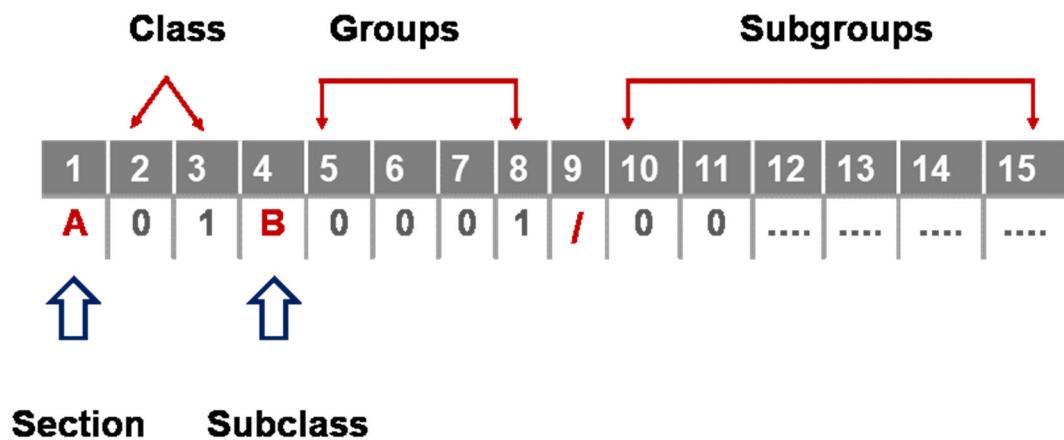
Additional examples of the CPC symbols are given in the following pages.

SYMBOL	LEVEL	TITLE
A	Section	Human Necessities
A01	Class	agriculture; forestry; … hunting; trapping;..
A01B	Subclass	soil working in agriculture or forestry; parts, details, or accessories of agricultural machines or implements…
A01B 1/00	Main Group	Hand tools …
A01B 1/06	Subgroup	Hoes; Hand cultivators…

A	B	C	D	E
a hat (A42B)	a process for manufacture of plastic pipe (B29D)	manufacture of iron (C21B)	A hand iron (D06F)	Skylight (E04D)
a fish hook (A01K)	a process for manufacture of metal pipe (B21C)	A polymer (C08)	Non-woven fabrics (D04H)	Chimney (E04H)
a cigarette (A24D)	a process for producing plastic catheters (B29)	Metal alloy (C22C)	A loom (D03D)	Sunshade (E04F)
a wrist strap (A44C)	hovercraft (B60V)	Dye (C09)	A method of dry-cleaning (D06L)	An injection molding machine (B29)
a chair (A47C))	steering wheel (B62B)	Production of beer, wine, or other alcoholic beverages (C12)	A washing machine (D06F)	A door lock (E05B)
a mirror (AA47G)	micromechanical system (B81B)	A faucet which does not build up lime scale because of a particular coating (C09)	A tool for embroidering (D05C)	A false ceiling (E04B)
a catheter (A61M)	Bicycles (B62K)	A funnel made of a novel alloy which does not contaminate pure liquids passing through it (C22C)	A paper making machine (D01F)	A dredger (E02F)

F	G	H
Faucets (F16K)	Pianos (G01C)	Television (H04N)
Steam engines (F01B)	Watch (G04)	Electric cable (H01B)
A pipe (F16L)	Lenses (G02B)	Radio transmitter (H04B)
An actuator (F15)	Speedometer (G09B)	Magnetic material (H01F))
Lamps (F21S)	Flight simulator (G01P)	Electric switch (H01H)
Refrigerator (F25D)	Photo camera (G03B)	TV Camera (H04N5)
A missile launcher (F41F)	Gas composition analyzer (G01N)	CCD sensor manufacturing process (H01L27)
Explosives (F42)	Telescope (G02B)	A home automation network protocol (H04L)
Flame monitoring and control system (F23)	Smoke alarms (G08B)	RF responsive magnetic material (H01)
Ventilation systems with presence detection	Image processing method (G06T)	Radio frequency receiver (H04B)

US 20230122214A1

(19) **United States**

(12) **Patent Application Publication** (10) Pub. No.: **US 2023/0122214 A1**

Kernick et al. (43) **Pub. Date:** **Apr. 20, 2023**

(54) **DEFECT DETECTION USING SYNTHETIC DATA AND MACHINE LEARNING**

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G06N 3/04 (2006.01)

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CPC *G06T 7/0004* (2013.01); *G06K 9/6262* (2013.01); *G06K 9/6256* (2013.01); *G06N 3/04* (2013.01); *G06T 2207/20081* (2013.01); *G06T 2207/20084* (2013.01); *G06T 2207/30108* (2013.01)

(57) **ABSTRACT**

A method for quality control of contact lens packages comprises receiving a first data set comprising a plurality of images of a contact lens package having physically implanted defects; receiving a second data set comprising a plurality of images of a contact lens package having digitally implanted defects; testing and training, on the first and second data set, a model to determine a validated one or more quality control models; capturing image data of a package of a contact lens; analyzing, based on the validated one or more quality control models, the image data; and causing, based on the analyzing, output of a quality control metric indicative of at least an accept or reject condition of the package.

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(12) United States Patent
Peyman

(10) Patent No.: **US 11,259,914 B2** — Patent No.
(45) Date of Patent: **Mar. 1, 2022** — Patent Publication date

Title —
(54) **MOLDING OR 3-D PRINTING OF A SYNTHETIC REFRACTIVE CORNEAL LENSLET**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/927,882**

(22) Filed: **Jul. 13, 2020**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**
A61F 2/14   (2006.01)
B29C 64/124   (2017.01)
(Continued)

(52) **U.S. Cl.**
CPC *A61F 2/1451* (2015.04); *A61F 2/148* (2013.01); *B29C 64/124* (2017.08); *B33Y 10/00* (2014.12);
(Continued)

Classification —
(58) **Field of Classification Search**
CPC A61F 9/0079; A61F 9/008; A61F 9/00804; A61F 9/00812; A61F 9/00821;

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(57)   **ABSTRACT**   — Abstract

A method of forming and implanting a synthetic corneal lenslet in an eye of a patient includes the steps of: forming a synthetic lenslet from a collagen solution using a mold or a 3-D printer that are configured to form the synthetic lenslet into a predetermined shape for correcting a particular refractive error of the patient; forming a cavity for receiving the synthetic lenslet in the cornea of the eye of the patient; inserting the synthetic lenslet into the cavity of the eye; applying a photosensitizer into the cavity of the eye so that the photosensitizer permeates at least a portion of the tissue surrounding the cavity and at least a portion of the synthetic lenslet; and irradiating the cornea so as to activate cross-linkers in the synthetic lenslet and cross-linkers in the portion of the tissue surrounding the cavity, and thereby prevent an immune response.