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A study on Positioning Transition of R&D Areas of Digital Camera Manufacturers

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Abstract

In this analysis, we conducted a quantitative analysis of digital camera research and development trends, which account for 90% of global shipments by Japanese companies. Japanese companies have a mix of existing camera manufacturers and new entry electronics manufacturers. The purpose of this study was to analyze and clarify the digital camera-related patent data from the viewpoint of positioning in the R & D field to see how the research and development of each company's specialty technologies and technologies that need to be caught up has progressed. The research and development areas of existing camera manufacturers and new entry electronics manufacturers have been approaching since 2000 compared to the 1990s.
Keywords: Digital camera, quantitative analysis, patent data, correspondence analysis

1 Introduction

There is no single definition for a digital camera. Eastman Kodak invented the world's first digital camera in 1975, when the camera that converts light entering through the lens into an electrical signal by an image sensor and records and outputs it was defined as a digital camera. In connection with the invention, in May 1977, Eastman Kodak applied for a patent entitled "Electronic Still Camera (USP 4131919)". Then, in the 1980s, Japanese companies put digital cameras into practical use as analog electronic still cameras. In the 1990s, digital cameras digitized analog electrical signals from image sensors and generated and recorded images using an image processing engine. Digital cameras were expensive when they were first commercialized. Digital cameras did not form a market because of competition with video movie cameras that were introduced to the market at the same time. Under these circumstances, some digital camera developers had stopped or reduced R & D. The digital camera "QV-10" launched by Casio Computer in 1995 contributed to the formation of the digital camera market. The QV-10 achieved a low price, and a built-in LCD monitor made it possible to immediately check the captured image. In addition, the QV-10 became an explosive hit because it was able to connect to a Microsoft Windows 95-based PC released in the same year. With the launch of the digital camera market along with the QV-10 hit, existing camera manufacturers, photographic film manufacturers, and home appliance manufacturers entered the market at once. Although the

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Table 6: Description of Digital Patent (H04N5/22～25:33～36, H01L27/146～148)

IPC	Descriptions
・H	ELECTRICITY
・H04	ELECTRIC COMMUNICATION TECHNIQUE
・H04N	PICTORIAL COMMUNICATION, e.g. TELEVISION
・H04N5/00	Details of television systems
・H04N5/222	Studio circuitry; Studio devices; Studio equipment
・H04N5/225	Television cameras
・H04N5/228	Circuit details for pick-up tubes
・H04N5/232	Devices for controlling television cameras, e.g. remote control
・H04N5/235	Circuitry {or methods} for compensating for variation in the brightness of the object
・H04N5/238	by influencing the optical part of the camera
・H04N5/243	by influencing the picture signal
・H04N5/247	Arrangements of television cameras
・H04N5/253	Picture signal generating by scanning motion picture films or slide opaques, e.g. for telecine
・H04N5/257	Picture signal generators using flying-spot scanners
・H04N5/33	Transforming infra-red radiation
・H04N5/335	using solid-state image sensors
・H04N5/341	Extracting pixel data from an image sensor by controlling scanning circuits
・H04N5/343	by switching between different modes of operation using different resolutions or aspect ratios
・H04N5/345	by partially reading an SSIS array
・H04N5/347	by combining or binning pixels in SSIS
・H04N5/349	for increasing resolution by shifting the sensor relative to the scene
・H04N5/351	Control of the SSIS depending on the scene
・H04N5/353	Control of the integration time
・H04N5/355	Control of the dynamic range
・H04N5/357	Noise processing, e.g. detecting, correcting, reducing or removing noise
・H04N5/359	applied to excess charges produced by the exposure
・H04N5/361	applied to dark current
・H04N5/363	applied to reset noise, e.g. KTC noise
・H04N5/365	applied to fixed-pattern noise, e.g. non-uniformity of response
・H04N5/367	applied to defects, e.g. non-responsive pixels
・H04N5/369	SSIS architecture; Circuitry associated therewith
・H01	BASIC ELECTRIC ELEMENTS
・H01L	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
・H01L27/00	Devices consisting of a plurality of semiconductor or other solid-state components formed in or on a common substrate
・H01L27/146	Imager structures
・H01L27/148	Charge coupled imagers