Estudio exploratorio del portafolio de productos

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1. Introducción

Una patente es un conjunto de derechos exclusivos concedidos por un Estado al inventor de un nuevo producto o tecnología, susceptibles de ser explotados comercialmente por un período limitado de tiempo, a cambio de la divulgación de la invención.

En un mundo globalizado, donde el éxito de desarrollos tecnológicos depende significativamente de la colaboración de los distintos actores, analizar los datos de las patentes tiene un potencial inexplorado. Las herramientas para realizar distintos analisis de la información disponible permite mejorar la toma de decisiones a todo tipo de organizaciones.

El número de patentes aprobadas en el mundo crece rapidamente cada año, por lo que se requieren análisis de patentes que extraigan efectivamente la información valiosa contenida en ellas.

PatentScope es la base de datos pública de WIPO. Incluye la cobertura de las solicitudes del Tratado de Cooperación en materia de Patentes (administradas por WIPO) y una amplia gama de otros países, incluida la Oficina Europea de Patentes, la USPTO y Japón. Actualmente la base cuenta con más de 97 millones de documentos de patentes. Las bases con las que se realiza el análisis se descargan desde Patente Scope.

1.1. Limpieza de la data

Se filtran las patentes para dejar aquellas desde el año 2000 hasta la fecha según el año de publicación. Se procesan las patentes para borrar missing values, cambiar formatos en las columnas según corresponda.

Cuadro 1: Descripción de las bases utilizadas

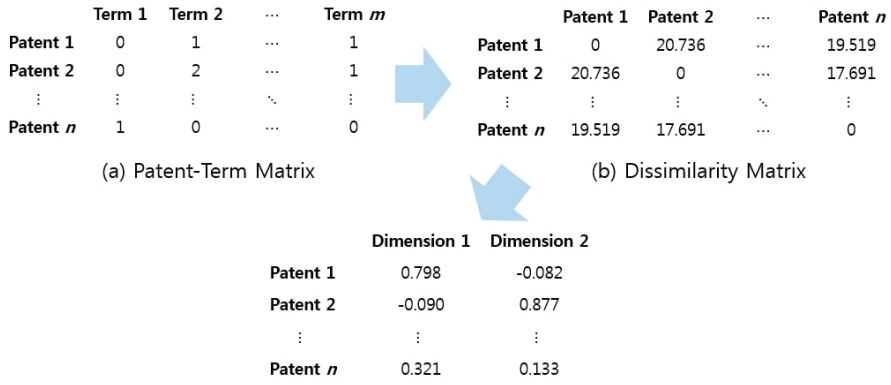
Temática	Línea de negocio	Query	N de patentes
Monitoreo de Suelo	InstaSoil	FP:(soil) AND ((crop) OR (farm)) AND ((catheter) OR (probe)) AND (monitoring)	214
Monitoreo y Control de Pozos y Tranques	InstaWell	FP:(water) AND ((crop) OR (farm)) AND (flow rate) AND (monitoring) AND ((well) OR (blockade))	1216
Sistemas de Control de Valvulas Inalambricas	InstaFlow	FP:(irrigation) AND ((crop) OR (farm)) AND ((wireless) OR (remote)) AND (controller)	65
Estaciones Climaticas	InstaWeather	FP:(weather) AND ((crop) OR (farm)) AND (measure)	293
Imágenes Satelitales y Drones	SkyCrops	FP:(images) AND ((crop) OR (farm)) AND ((drone) OR (satellite)) AND (monitoring)	471

1.2. Estructuración de la data

Para poder analizar la base en profundidad se debe encontrar aquellas patentes que están más relacionadas con los servicios desarrollados por Instacrops. Es debido a lo anterior que se implementa métodos de clustering basado en el contenido de texto de los abstracts de los documentos de las patentes.

Para poder implementar los métodos de clustering es necesario obtener métricas de distancia entre cada uno de los documentos de las patentes. Para realizar esto se sigue la metodología propuesta en el artículo "Technology Clusters Exploration for Patent Portfolio through Patent Abstract Analysis" de los autores Gabjo Kim, Joonhyuck Lee, Dongsik Jang and Sangsung Park.

En primer lugar se enlistan todos las palabras que están presentes en todos los abstracts, se eliminan las stopword, es decir, articulos, conjunciones y conectores. Se genera una matriz Patente-Concepto. Se calcula la distancia entre cada par de patentes. Por último, se aplica una reducción de la dimensionalidad donde se obtiene una posiciónde dos dimensiones para cada patente. La metodología se puede ver en la siguiente figura.



2. Obtención de los Clusters

Se prueba con el método Affinity Propagation (AP) Clustering. Se obtienen los siguientes clusters para tema.

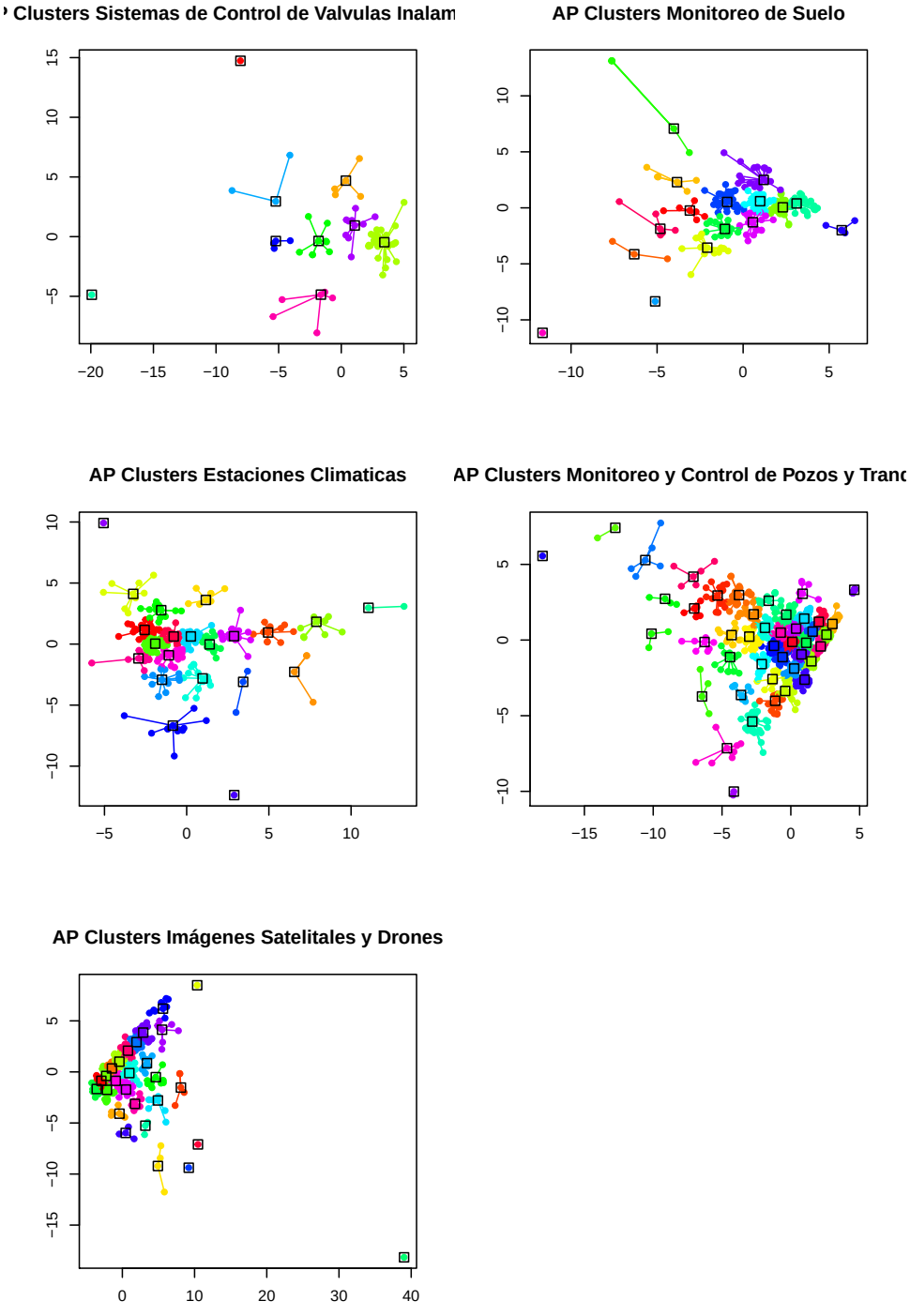


Figura 1: Resultados con AP Clustering

Cuadro 2: Descripción de las bases utilizadas

Temática	# de Clusters	N de patentes	Net Similarity	Input Preference	# de Iteracciones
Monitoreo de Suelo	16	214	-542	-13.06	438
Monitoreo y Control de Pozos y Tranques	44	1216	-680	-9.26	177
Sistemas de Control de Valvulas Inalambricas	9	65	-395	-25.51	143
Estaciones Climaticas	21	293	-493	-13.39	163
Imágenes Satelitales y Drones	27	471	-546	-12.47	427

3. Definición de los Clusters

Usando el índice TF-IDF se obtienen los conceptos claves de cada cluster, con los cuales se puede caracterizar la tecnología de cada clusters en cada base.

Cuadro 3: Definición de la tecnología de cada Clusters para Monitoreo de Suelo

Cluster	Tamaño	Keywords
1	7	sensor, modular, performance, cost, transmitter, future, normalization, radar, rugged, stages, thermopile, radiation
2	3	w, section, sub, moment, tot, amount, initial, entered, total, left, moments, subtracting
3	7	trench, radio, electrode, grain, module, display, cm, thermal, said, biodegradable, selective
4	15	cells, capacity, acids, plant, plants, analogue, derivative, pap, transformation, transgenic, recombinant, refers
5	25	membrane, side, piping, plate, supporting, pressure, fixedly, gate, microtensiometer, vapor, fuel, fluidly, piece
6	5	qualities, protein, remediation, reagent, contaminated, anaerobic, slow, transect, undesirable, water, root, release
7	19	elements, deriving, content, types, pair, relationship, means, property, conjunction, difference, insertable, smallest, vary

Cuadro 3: Definición de la tecnología de cada Clusters para Monitoreo de Suelo *(continued)*

Cluster	Tamaño	Keywords
8	26	reader, redundant, set, capacitor, locational, probes, value, transmit, analysis, data, irrigated, respect
9	28	extraction, mobility, mix, events, concentration, extractant, grooves, solution, component, thereby, moisture
10	1	test, ring, adapted, augmented, reality, capacitive, computing, material
11	27	cutting, green, hour, color, shoe, zone, pixels, recognition, classification, height, imls, period
12	5	aged, agrochemical, biologically, horticulture, added, nucleic, aperture, fast, sup, zones, active, aerobic
13	20	mast, body, housing, top, probe, wireless, anchor, encapsulating, gasket, house, perimeter, separable
14	19	hydrogel, b, chamber, regions, electrical, parameter, elongated, subterranean, tension, window
15	1	microorganisms, compositions, biomass, strains, ions, sentinel, degrading, enzymes, exchange, extract, isolates, mustard
16	6	nh.sub, windrow, ion, optical, diagnosis, microalgae, shortage, sidewalls, nitrate, bioreactor, physiological

Cuadro 4: Definición de la tecnología de cada Clusters para Monitoreo y Control de Pozos y Tranques

Cluster	Tamaño	Keywords
1	8	shuttle, survey, ozone, lawns, frog, layers, blueprints, collapsible, vehicle, impermeable, wells, biogas, seed
2	18	sorption, synthesis, green, atomic, influent, h2o, hydrogen, batch, disposed, geographic, shot
3	16	harvesters, righting, nanofuel, compute, watercut, impedance, article, tissue, cannabis, circuits, reflecting, permeability
4	24	polynucleotides, soluble, li, eplerenone, i, oligandrum, oxidants, pythium, radical, acid, nanoparticle, conjugate
5	25	refrigerant, exchanger, supplements, dosing, livestock, heater, passing, feed, line, pipe, supplement, trough
6	34	milking, sound, cleaning, cups, arrangement, managed, interconnecting, teat, automatic, orifice, vessel, circulation
7	15	fueled, potable, purifier, generator, flushing, fluidly, pool, renewable, sump, turbine

Cuadro 4: Definición de la tecnología de cada Clusters para Monitoreo y Control de Pozos y Tranques *(continued)*

Cluster	Tamaño	Keywords
8	26	peaking, dispensers, rinse, controllable, additive, stage, membranes, factor, relate, usage, problems, actual
9	16	sanitizer, consumer, dishwasher, metric, stray, meteorological, save, prediction, data, query, property
10	19	stunner, vascular, attacks, sps, stunning, aerofoil, gypsum, security, compromised, windrow, nodes, reaction
11	33	br, hydroseparator, effluent, anolyte, eductor, ceramic, neonicotinoid, anions, ectoparasites, eduction, fly, isoxazoline, nahcolite, trapped, upflow
12	90	bypass, wetland, l.s.i, receivers, vapour, weak, constructed, emitter, rice, resin, treated, stream
13	2	shell, egg, tip, shaped, transferring, hydrogel, said, b, sup, allocation, geo, credit
14	4	corner, sprinkler, arm, pivot, collector, irrigation, condenser, evaporator, gardening, stations
15	3	flood, termite, pixel, beds, estimated, pixels, polyurethane, convection, inundation, oven, slab, strategy
16	4	waterline, oily, bioreactor, mcu, subgroup, simultaneous, party, filter, settling, transmitter, solids
17	13	sb, humic, biochar, lignan, phase, class, oligomer, nm, sand, composition, cage
18	77	insects, sap, seeding, trays, leaf, hopper, transport, insect, channel, radio, crickets, gauges, logging, sheaves, sort
19	34	backflush, dip, placement, milker, dairy, conflicting, grapevines, incompatible, laying, photobioreactor, dispensed, chiller, stall
20	12	villages, village, domestic, fixture, wqi, however, customer, would, excess, swhs
21	23	designer, ruminant, tolerance, methyl, polypeptides, standardized, butanol, improves, transgenic, expressed, photobiological
22	35	weir, racking, receptacle, fill, emulsification, grass, impeller, magnetic, tower, bicycle, blow, descaling, seat, video
23	16	weedicide, sprayer, foliar, rain, greenhouse, dss, panel, dish, retort, arms, destination, fpga, reactors, row
24	51	structured, riser, enclosed, fluidic, dryer, constituents, biochips, lis, poikilothermic, boiling, emergency, substantially
25	8	priority, iwmi, budget, landscape, billing, household, proceed, estimates, cycle, if, will
26	67	blend, binder, carbohydrate, mps, factory, insurance, flaws, macropore, node, home

Cuadro 4: Definición de la tecnología de cada Clusters para Monitoreo y Control de Pozos y Tranques *(continued)*

Cluster	Tamaño	Keywords
27	6	bacteriophage, tiles, encoded, extends, program, optimizing, mask, yard, defense, metadata, member, protocols
28	117	compositions, androstan, bromo, hydroxy, steroids, immune, analogs, steroid, hemihydrate, modulate, regimens, responses
29	25	milk, underway, uploading, stationary, holding, unloading, concentration, depositing, cip, mcs, osmosis
30	19	shoe, tool, driven, airflow, sections, cooled, precipitators, throat, front, pistons, pph
31	1	flavorant, pa1, vaccine, contact, alcohol, admixing, antigen, peroxide, metallic, nitrate
32	23	sodic, desiccant, dispersal, connector, et, dosage, schedule, dynamic, amusement, centrally, consolidation, encourage, rides, tbm
33	60	assessed, climatological, irrigated, reader, sensing, computer, insolation, zonal, infrared, partially
34	20	analyzer, multivalent, pot, steam, polarization, path, storm, tomatoes, monovalent
35	2	ac, erv, bait, hour, humidifier, sour, openings, corridor, sidewall, ammonia, indicators, managing
36	49	glp, floatable, tuples, moiety, irradiance, germinant, mustard, images
37	7	equilibrium, foods, iodine, station, acquires, budgeting, package, foundations, variable
38	8	cyclooxygenase, deliverable, peptide, gel
39	8	glycol, computing, item, strut, superheated, spent, columnar, deicing, electrons, ethylene, peroxycarboxylic, propylene
40	37	inflexible, siphon, walled, wamp, thin, groundwater, compressed, rights, opening, admitting, scenario, transect
41	52	autism, polyelectrolyte, disorders, syndrome, asd, nhps, disorder, wt, charge
42	6	lagoon, tray, multiplicity, communicating, hydroponic, re, ones, transceivers, sulfuric, drain, gis, graphic
43	70	inverter104, tied, bus, pigsty, reagent, mark, mfc, overland, pointer, immobilized, rooftop
44	33	barn, ci, c2, fans, turfgrass, task, borewell, rootzone, spv, detector, ecosystem

Cuadro 5: Definición de la tecnología de cada Clusters para Sistemas de Control de Valvulas Inalambricas

Cluster	Tamaño	Keywords
1	1	period, apparatus, first, resource, during, model, schedule, adjusted, adjust, assessment, represents, time
2	5	crop, graphical, threshold, location, geospatial, meteorological, modeling, start, stop, field, soil
3	26	e.g, cultivation, yield, crops, mechanized, recipe, target, farm, growing, production, reference, seed
4	9	vt, communicating, multiplicity, said, flow, ones, station, transceivers, fluid, coordinator, vehicle, valve
5	1	module, zone, central, sensing, zigbee, intelligent, body, any, buttons, client, discloses, far, inside, terminal, timing, touch
6	3	factor, instructions, programmable, deficit, program, software, radio, computing, apparatuses, battery, capacitor, cpu, extends, full, generator, independently, super
7	4	adapter, budget, controllers, et, valves, calculates, wired, server, local, point, ac, ambient, broadcast, centrally, connection, couple, dc, direct, entering, geo, infrared, matrix, means, outputs, preliminary, ratio, tbm
8	10	estimated, eto, value, supplied, each, booms, determines, labors, transpiration, ui
9	6	carriage, climate, environmental, package, track, coupled, site, fpga, agricultural, conditions

Cuadro 6: Definición de la tecnología de cada Clusters para Estaciones Climaticas

Cluster	Tamaño	Keywords
1	24	gtc, yr, algae, ccs, capture, stage, bioreactor, fans, underwater, lidar, autodyne, dioxide
2	11	package, instrument, presentation, streams, index, extracted, operations, instructions, concurrent, converted, electronics, offsetting
3	4	renovation, crop, pest, recovery, water, temporal, node, vegetation, nitrogen, vineyard, training, profile
4	8	navigational, computing, ensemble, altitude, forecasts, crime, doorbell, mobile, traffic, aircraft, differences, road
5	9	b, certified, crops, irrigation, soils, robot, activities, need, requirement, farmers, precision

Cuadro 6: Definición de la tecnología de cada Clusters para Estaciones Climaticas *(continued)*

Cluster	Tamaño	Keywords
6	10	protection, vectors, product, target, pressure, biotic, heuristic, targets, optimizer, treatment, domain, formulas, geo, interval, score
7	39	grower, prescriptions, acquiring, biomass, maturity, inputs, season, step, soil, acquired
8	14	cultivation, houses, optimized, surrounding, environment, cultivated, house, affects, vinyl, copyright, green, kipo
9	15	renewable, power, boxes, generation, energy, grid, total, hybrid, instantaneous, regulate, subject, plant
10	2	lift, selections, tract, forum, data, meter, flight, interfaces, associate, cleansed, geospatial, issuer
11	15	br, count, prescription, animal, livestock, athletic, basin, rating, thinned
12	33	entry, microwave, severity, candidates, weighted, rdpu, link, laser, pre, cdpu
13	13	infections, gases, co2, h2, ornamental, loss, solution, hydrant, n2, sap, uan, flow
14	3	grain, pool, accident, component, bin, exchange, spa, alpha, amylase, driver, fragment
15	11	rainfall, mining, string, internet, his, forecasting, moisture, affect, scientific, base, ask, assembles, call, collector, difficulty, downloads, oriented, packet, shown
16	1	velocity, wind, series, positions, element, pole, assembly, turbine, bracket, record, true, shield
17	1	currents, installations, array, global, modify, ocean, large, aim, dc, inventor
18	18	threat, localized, infrastructure, inputting, rmd, said, adapted, code, engine, observation
19	23	reduced, contingent, droplet, claims, counter, vehicle, increased, droplets, costs, optimum
20	12	eg, tower, turbines, photovoltaic, reading, wispr, nacelle, rotatable, charging
21	27	flood, portions, geographical, depth, dli, inflow, inundation, mitigation, outflow, scenario, specified, cells

Cuadro 7: Definición de la tecnología de cada Clusters para Imágenes Satelitales y Drones

Cluster	Tamaño	Keywords
1	52	b, i, road, baby, cattle, gnss, uav, module, web, perpendicular, tumor, flight
2	5	plot, stamped, inoperative, guides, still, compression, viewpoint, cardinality, translational, trap, workflow, tile
3	45	accident, physiological, reconstruction, insurance, collision, curve, insurer, spooler, fault, markings, route, ten
4	6	valid, previous, luminance, energy, average, ratio, value, best, focused, averaging, square, squared
5	4	container, bed, activated, broad, guest, light, plants, applications, containers, emits, spectrum, circuitry
6	1	arthropod, taillight, line, damage, game, frame, exposure, motion, temperature, anomalous, rooftop, superpixels, tilled
7	55	encoding, group, elongate, analytes, identifiable, personally, rotating, format, tiles, sequencing, n, person
8	50	aquatic, propeller, wearable, consumable, underwater, telemetry, tagged, product, animal, horizontal, vertical, occlusion, transceiver
9	26	proprietor's, inventory, overhead, photographic, raw, subject, intra, plantation, templates, enroll, monocular, near
10	10	aperture, converging, beam, element, picture, adjustable, exceeding, optical, adapted, passing, least, setting
11	27	terrestrial, radiographic, medium, solar, resolution, orthographic, wheel, forecast, synchronous, privacy, analog, photosensor
12	1	outer, inner, gaze, pupillary, inter, first, direction, view, primary, stream
13	3	worksite, adjustment, destination, files, code, controllable, memory, program, relatively, mobile, type
14	22	poi, synchronization, window, medical, blending, semantic, normal, retention, alternate, fig, factor
15	8	uncompressed, master, sets, compressed, programmed, meta, signage, symptoms, class, alternative, markers
16	10	prospective, trade, character, particles, conference, ei, nodes, signals, region, illumination, worker
17	17	wound, scenes, intensity, convolution, healing, intent, working, force, main, strip, mask
18	1	br, plant, conversion, channel, iterative, encoder, hearing, resonance

Cuadro 7: Definición de la tecnología de cada Clusters para Imágenes Satelitales y Drones *(continued)*

Cluster	Tamaño	Keywords
19	9	peripheral, logic, pre, measurement, formation, learning, top, aoi, parking, services, vehicle
20	4	clip, commerce, promoting, broadcast, clips, band, unique, channels, demand, promoted, stored
21	23	guardians, coverage, geostationary, kilometer, lanes, harvester, water, roofs, earth, links, real
22	8	blocking, board, sample, tube, grain, color, lengths, closest, colored, hypothetical, reagent, boundary
23	15	computers, delta, blocks, rendering, instructions, second, filtered, block, chunks, regenerated, regenerating
24	20	instance, classifier, extracted, frames, trained, phase, training, feature, cannot, static, tracing
25	9	soft, diagnosis, e.g, robotic, wind, language, interferometer, infrastructure, search, natural, roof, self
26	39	manifest, cargo, property, facing, growth, driver
27	1	animals, behaviour, categories, job, latent, vectors, render, factors, ofc, states, permanent

4. Análisis IPC

La Clasificación Internacional de Patentes, IPC por sus siglas en ingles, es un sistema jerarquico para la clasificación de patentes a partir de las distintas áreas de tecnologías a las que pertenecen.

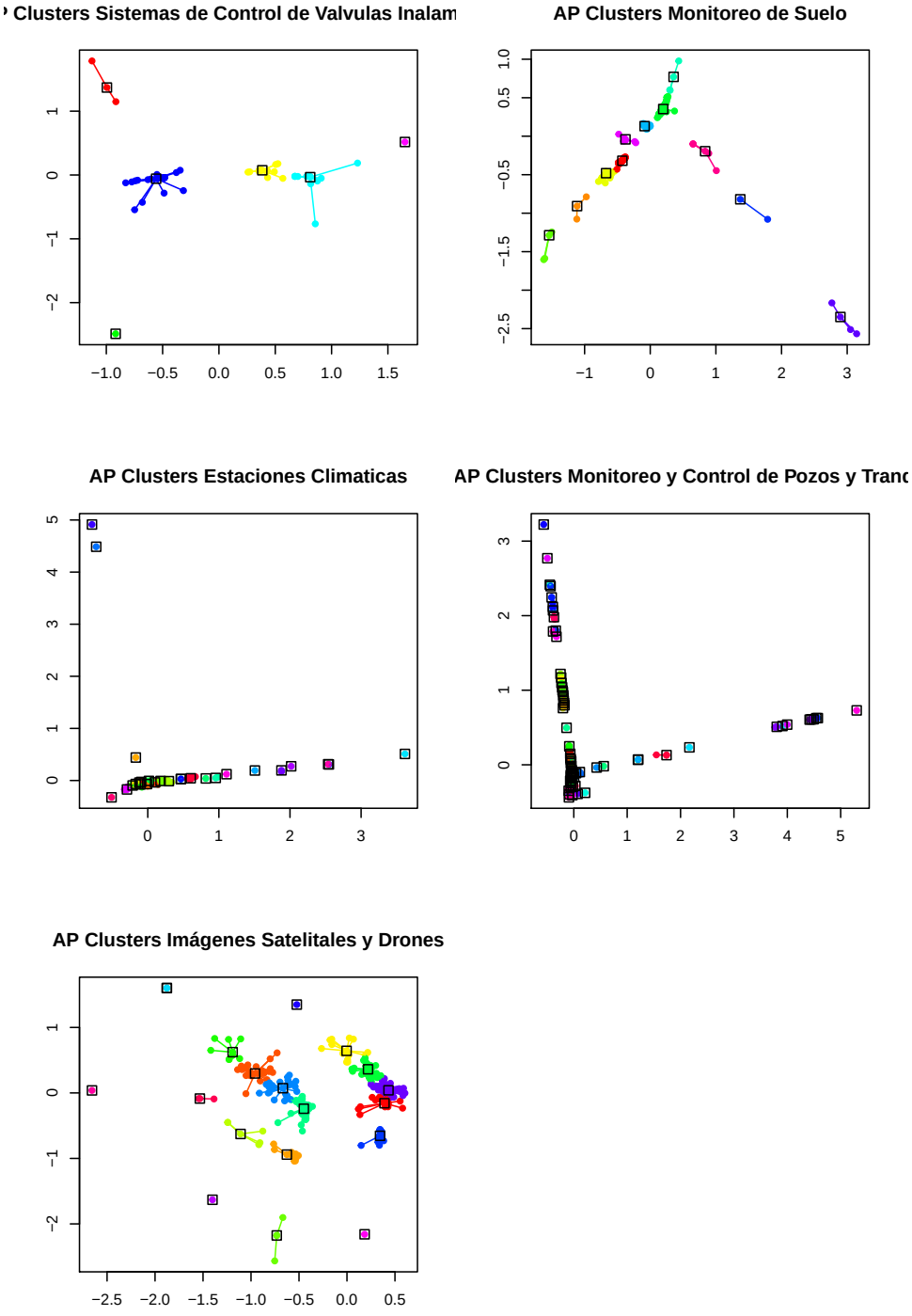


Figura 2: Resultados con AP Clustering

Cuadro 8: Descripción de las bases utilizadas

Temática	# de Clusters	N de patentes	Net Similarity	Input Preference	# de Iteracciones
Monitoreo de Suelo	11	214	-6.086	-0.393	195
Monitoreo y Control de Pozos y Tranques	77	1216	-0.180	-0.001	439
Sistemas de Control de Valvulas Inalambricas	6	65	-6.695	-0.746	158
Estaciones Climaticas	27	293	-0.322	-0.008	430
Imágenes Satelitales y Drones	19	471	-17.906	-0.660	428

Cuadro 9: Definición de la tecnología de cada Clusters para Monitoreo de Suelo

Cluster	Tamaño	Clasificaciones
1	36	g01n3324, g01n2702, g01c2120, g01c2100, g01n122, g01n2127, g01n302
2	3	a01g2516, b05b1200, a01b6900, g01n1506, g05d102
3	21	c12n1582, c07h2104, c12n904, c12n906, c12n988
4	4	g01n3324, a01b6302, g01n213554, g01n3000, g01n3002, g01n3006
5	108	g01n3324, a01g2516, g01n2722, g01n108, g01n2704
6	4	g01n3324, g01n100, a01g2516, g01n108, a01b7900
7	19	a01c2302, a01n6100, c05f300, g06q5002, c05f1700
8	2	a01p704, a01n6300, a01p1300, a01p500, a01n3702, c05g302
9	4	a01g2516, g05b19042, g05d706, a01g2502, a01b7900
10	7	c12n1582, a01h500, a01h510, a01h400, c12n504, c12p2106, g01n3320
11	6	c07k14415, a01h500, c12n1529, c12n1582, c12n1563

Cuadro 10: Definición de la tecnología de cada Clusters para Monitoreo y Control de Pozos y Tranques

Cluster	Tamaño	Clasificaciones
1	29	g01n3324, h04l2908, a01g2509, e21b4908, a01g924
2	3	a01g2516, g06q5002, a01g2222, a01k39012, g01b1500, g01n1304, g01n2911, g05b1304, g06f3020, g06q1004
3	181	a01h500, c12m100, a01k6100, a01k6304, a01g
4	6	a01g2516, g05b19042, a01g2509, a01c700, b05b120, b05b130
5	9	a01g200, a01g1702, g01r1900, g01r19165, a01g2502
6	7	b01d2923, b01d2968, b01d2990, b01d3502, b01d2911, b01d2956, b01d2960, e03b707
7	6	c02f104, a01g, c12n504, a01h500, c02f1112
8	12	b01f312, a01g3100, a01c1400, b01f100, f17d100
9	8	a01k6304, a01k6100, c02f100, a61k3306, c02f144, c02f332
10	21	g08b2100, g05d700, g01w100, g06f1130, g06n9900
11	59	a01g2200, a01g2502, g05b1502, a01g2700, a01g2516
12	15	f16k1704, f16k3106, b05b120, b05b1202, b05b1200, c02f148
13	3	a01g2502, a01g2516, g05b1502, h04l2908, a01g924
14	1	a61k3800, a61k3512, a01n6302, a61k3170, a61k3600
15	33	g05b1502, a01g2500, h02j328, f03d919, e03f100, f03d911, f24h120
16	20	a01g2516, a01g2502, a01g1702, e02b728, g05b19048, h02s9900
17	27	g05d706, g05b1502, a01g2516, g01n3324, a01g2700
18	3	g05b1943, a01g2502, a01g2516, a01g1702, g01w110
19	1	b05b302, b05b1704, g05d706, b05b1208, a01g2700
20	11	g06q5002, a01g924, g06q1006, a01g3106, a01c1500, a01c1700
21	8	c02f158, c02f1461, a01k6300, c02f142, c02f330
22	17	g06q, c02f, g01n3318, b08b304, b08b908
23	6	g06q1000, g01n3353, f03b1318, a01j702, g01n3318
24	6	a01j504, a01j700, a01j704, h01m, c02f142
25	3	b01d3600, c02f142, b01d2416, b01j3900, c02f152
26	3	a01g2700, a01g700, a01g2500, a01g908, f21v3300, g01n213554, g01n21359, g01n2912, g01n2914, g01n2924, h04r1901, h05b4710
27	29	c07d31178, c07j7300, a61k31568, c07j100
28	8	f16k3100, a01g910, c09k1714, f16k1736, b05b1704, g05b1101
29	50	a61k3156, c07c900, a61k31565, c07j300, a61p3702, c07c100
30	73	a61k31566, a61k3156, a61p3104, a61p3100
31	7	g01r2726, b05b1208, g01n500, g01n502, a01g2500
32	11	a61k4712, a61k4740, a61k4742, a61k972, c07j3100

Cuadro 10: Definición de la tecnología de cada Clusters para Monitoreo y Control de Pozos y Tranques *(continued)*

Cluster	Tamaño	Clasificaciones
33	1	a61k31415, a61k4732, a61k4738, a61k910, a61k3142, a61k926
34	1	a01c1102, a01g900, a01c700, a01b7900, a01c100
35	1	a61k3135, a01n4302, a01n4316, a61k31565, c07j300
36	1	a61p3700, a61k3156, c07j100
37	1	c02f100, c02f10308, h02s4044, c02f144, b01d6116, h01l31048, h02s1030
38	1	a61k9107, a23l130, a61k31545, a61k4724, a61p306
39	3	a61p3500, a61k3156
40	1	a61k31585, c07j100
41	1	g05d1100, a01g2500, a01g2516
42	14	a01n5700, a61k3166, a61k914, a61p3500, a01n5728, a61k3576, c12n1509, c12n1586, c12n15861
43	6	a61k3156, a61k31565, c07j300, c07j100, a61k3166, a61k3800
44	1	b05d100, b05b1200, a01g2516
45	1	a01g2516, a01g924, g01n3324, g06f302, a01g3102
46	1	g05d700, g05d2200, g05d706, g05d2202, a01g2516
47	3	a01g2700, a01g2516
48	1	a01g2516, a01g1700, a01g2502, b05b300, g05d700
49	2	g05b700, g05d700, a01g2516
50	1	a61k3156, a61k3804, a61k31565, c07j300, a61k31695
51	2	c02f300, c02f302, c02f334, c02f328, c02f330
52	4	a01k6100, a01k6304, b05c100, a01k6300
53	1	a61p2900, a61p100, a61p102, a61p104, a61p1504, a61p1702, a61p1706, a61p1710, a61p1902, a61p1910, a61p2100, a61p2104, a61p2506, a61p2528, a61p2702, a61p2712, a61p910, c07d23360
54	1	a61k3156, a61k31565, c07j300, c07j100, a61k3158
55	1	a61k31565, c07j300, a61k3156, c07j100, a61k3157
56	2	g05d706, a01g706, h04b724, g01w100, a01g2509
57	1	a61k3156, a61k31565, c07j300, c07j100, a61k4800
58	1	c02f128, b01j4700, c02f1116, c08h9900, b09c100
59	3	g01r2726, g01n2722, a01g2502, a01g2506, g01n3324
60	1	a61k31573, a61k31565, c07j300, a61k3817, c07j4100
61	5	b67d508, a01g2516, g05d700
62	6	a61k926, a61k31415, a61k31135, a61k924, a61k31341, a61k922
63	1	a01g2516, b05d100, g05b1101, g05b1918
64	1	a61k3817, c07j1700, c07j7300, a61k31568, a61k3800
65	1	c02f132, c02f128, c02f178, a01b7902, a01h300
66	2	c02f100, b01f1504, b01f312, c02f128, a01n5900, b01f504
67	1	g05d706, g05b1502, h04l2908, a01g2516, g05b19042

Cuadro 10: Definición de la tecnología de cada Clusters para Monitoreo y Control de Pozos y Tranques *(continued)*

Cluster	Tamaño	Clasificaciones
68	1	c02f320, c02f1463, b01d1702, c02f312, b01d2100, b01d2124
69	8	c02f100, c05f300, c05f700, b63b1700, c05f900
70	1	c12n1582, c07k14415, b01d5356, c05c502, g01n3318
71	4	g05d1100, a01g2516, b05b1700, g05d700, a01g2500
72	124	a23b710, a23l120, a61k4700, a01n3744, a23k116, a23k118, a61p3300
73	3	a61k3158, a61p3120, c07j5300, c07j900, a61k3822, a61p3118, c07j1700
74	1	a61c100, c02f104, c02f1112, c02f1106, c02f116
75	3	a01g1500, a61k3147, b63b124, a01g902, e02b1100, g06f1700
76	6	a61p3500, c07c100, a61k4748, a61k31355, a61k4760, a61p3112
77	314	a01g2516, b05b1212, g05b1502, a01g2509, a01d7500, b05b1300, b05b901, g06t1100

Cuadro 11: Definición de la tecnología de cada Clusters para Sistemas de Control de Valvulas Inalambricas

Cluster	Tamaño	Clasificaciones
1	3	g06q, a01g, a01b, c12m, g01n, g08b, g08c, h04w
2	20	a01g2516, a01g2509, g05b1502, a01g100, a01g2700, b05b120, b05b1212, b05b1300, g01n3324, g05b1304
3	1	g01j100, g01k700, g01n2100, g01n2700, g01n3300, g05d2702, g08c1702, h04w2402, h04w438, h04w8418
4	12	g05b19042, a01g2516, a01g2502, h04w480, g05b1502
5	28	a01c2304, g08b2100, a01b7900, a01c2300, f04d1500, g05b1132, g05d100, g06f1900
6	1	a01g2500, a01g2516, g05d1100

Cuadro 12: Definición de la tecnología de cada Clusters para Estaciones Climaticas

Cluster	Tamaño	Clasificaciones
1	88	a01g1500, a01g2500, a01k6110, a01k6160, a01n2502, a01n6300, c02f332, e03b707, e04h400, g01c2126, g06f126, g06f1700, g08g109, h01l3100
2	7	g01w110, g06q5002, g06f1750, g06q1004, a01b7902
3	11	g06f1730, g06f1518, a01b7900, b60w40076, b60w5000

Cuadro 12: Definición de la tecnología de cada Clusters para Estaciones Climaticas *(continued)*

Cluster	Tamaño	Clasificaciones
4	1	g01w100, g01w110, g06q1000
5	29	g06f3048, a01b7900, g01w100, g06q4000, a01f2500
6	67	g06q4000
7	6	g06f700, g05b19418, g06f760, g06q3000, g06f1900
8	10	h04l900, h04l932, g06q1000
9	14	c07k1640, c12p2108, g01n27447, g01n33573, c12m134
10	21	g06f1900, g06q4000, g06q1000
11	10	g06q4000
12	1	g01w100, g01w102, b60w3000, b60w5014, g01c1300, g01s1706, g01s702, g06f1100, g06f16951, g06f30481, g06f30482, g06f30484, g08b2110, g16y2010, g16y4010, g16y4020
13	2	g01n3353, c07k1640, c12p2108, g01n27447, g01n33573
14	1	a01f2500, c02f100, g06q1000, a01d9100, a01b7900
15	1	g06e100, g06f1518, g06g700, g06g758, g06q1000, g06g748
16	1	a01m700, a01c2300, g01s514, a01c2100, b64d116, g01s1100, g01s1102, g01s1900, g01s1914, h04b7185
17	1	g06q3000, g06q4000, g06f1760
18	1	g06q3000, g06q1000, g06f16900, g06f1760, g06f1900
19	1	a01m120, a01m1300, a01m700, b05b1210, b05b1704, b05b1706
20	1	g06f1900, g07f710, g06q4000, a01g700, g06q1000
21	2	a01b7900, g06q5002, a01b7902, g01w110, a01c2100, g06q1004
22	1	c12m102, c12m112, c12m136, c12q300, c12m100
23	5	g06k900, a01g2516, g06k962, a01g, g05b19042
24	1	g06q, g01w102, a01h510, a01g, a01c, a01n, h04w402
25	1	g06f1900, h04b724, g05d706, g01w110, e02b300, g01r3126, g08b3100, g09b2912, h02s5010
26	1	g06q4000, g06q4008, g01w100, g01n122, c02f100
27	8	a01g2516, g05d706, g06k900, a01g2509, g05b1302

Cuadro 13: Definición de la tecnología de cada Clusters para Imágenes Satelitales y Drones

Cluster	Tamaño	Clasificaciones
1	29	h04n5232, a01b7600, h04n5225, g01s100, g01s1393, g07d900, h04n134, h04n1387, h04n5262
2	28	a01b4300, a01b59042, g06t713, g06t773, a01b6900, g06t770
3	9	a01b4300, a01b59042, g06t713, g06t773, a01b6900, g06t770

Cuadro 13: Definición de la tecnología de cada Clusters para Imágenes Satelitales y Drones *(continued)*

Cluster	Tamaño	Clasificaciones
4	14	g06k900, g06k962, g06n2000, g06q1006, h04w4021
5	6	h04n718, g08g104, g09g500, g06f314, a01b3316, a01b4906, a01c506, a01c720, a61b5022, a61b5024, a61b511, b60r1104, b60r25102, b60r2531, b64c3900, g01c1100, g01d2102, g01d702, g01d708, g01s1386, g01s1394, g01s504, g05d112, g06f30488, g06q2010, g06q2012, g06q2014, g06q2016, g06q2032, g06t1720, g07b1502, g07f1724, g08g100, g08g1052, g08g10967, h04b300, h04h6070, h04n2180, h04n720, h04n947
6	4	g06n2010, g06n500, g16h5020, g06n2020, g16h3040
7	9	g06k, h04n714, g06f1900, h04l2906, g06f1516, h04n21478
8	38	h04n718, g06k900
9	59	a63b7106, g01s1766, g01s1787, g01s1700, g06t100
10	1	g06t740, g01j328, g06k900, g06t700
11	1	g06t740, a01h102, a01m106, a01m120, a01m122, a01m2104, a01m300, a01m502, a01m504, b64d118
12	37	g06k962, g06k900, g06k946, g06n308, g01f2200, g01n2304, g06q5028
13	16	h04n718, g01p112, g06k922, h04n577, g06k900
14	1	g06k962, g06t711, g06n308, g06f16587, g06t700
15	213	g06k900, h04n718, b64b150, g06f1600, g06f1645, h04n5353
16	1	b60r104, b60r1062, g08g10968, g08g114, g08g104
17	1	g06k962, g06t1120, g06k900, g06t790, g06k946
18	1	g06t700, c12q16869, g01n2162, g01n3324, g01v810, g08b1500, g16b3010
19	3	g06k900, g06f1730, g06f301, g06t1160, g06f1658, g06q5016

5. Análisis IPC 2

La Clasificación Internacional de Patentes, IPC por sus siglas en ingles, es un sistema jerarquico para la clasificación de patentes a partir de las distintas áreas de tecnologías a las que pertenecen.

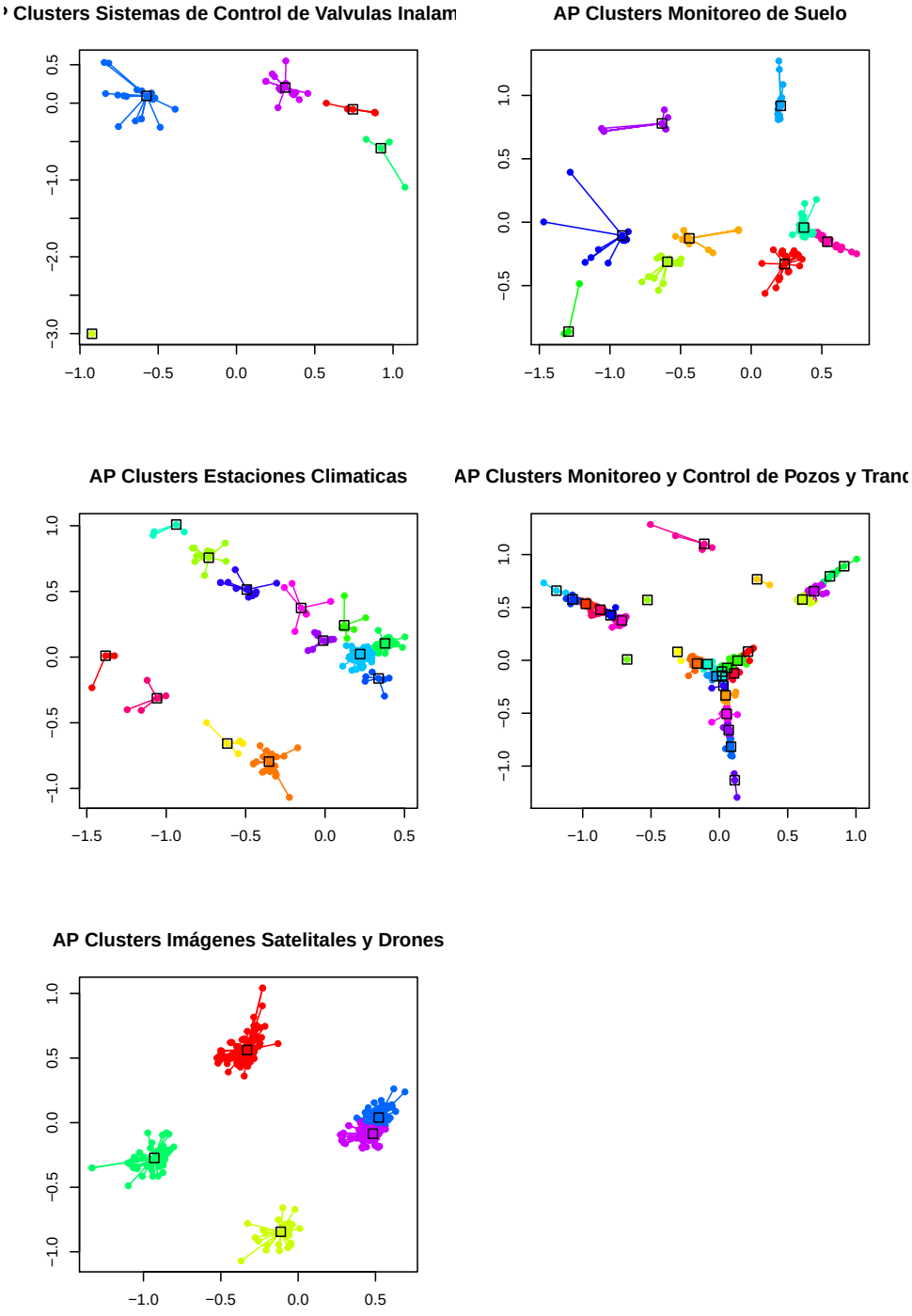


Figura 3: Resultados con AP Clustering

Cuadro 14: Descripción de las bases utilizadas

Temática	# de Clusters	N de patentes	Net Similarity	Input Preference	# de Iteracciones
Monitoreo de Suelo	9	214	-11.12	-0.750	140
Monitoreo y Control de Pozos y Tranques	30	1216	-3.17	-0.066	286
Sistemas de Control de Valvulas Inalambricas	5	65	-5.66	-0.683	133
Estaciones Climaticas	13	293	-3.51	-0.147	144
Imágenes Satelitales y Drones	5	471	-9.88	-0.965	169

Cuadro 15: Definición de la tecnología de cada Clusters para Monitoreo de Suelo

Cluster	Tamaño	Clasificaciones
1	25	a01b79, a01c5, a01c23, g01s19, g01n21
2	21	g01n33, g01n27, a01m1, b81b3, b81b7, b82b3, g01b17, g01d5, g01h9, g01l1, g01l9, g01n22, g01n7, g01n9, g06t19, h01l21, h01l23, h04b13, h04r23
3	19	g01n33, a01b79, g01n1, g01n21, a01c5
4	3	g01n21, g01n27, a01c5, b60k35, b60w10, g01v8
5	61	b09c1, g01d21, g01v3, g01r27, b67d7, g01m3, g01w1, h04b1
6	20	a01g25, g05b19, b05b12, g05d7, g01v9
7	17	g01n27, g01n33, g01n1, a01b79, a01g25, a01n47, g05b1
8	14	a01g25, g01n33, g01n27, e02b13, g05d22, h04l7
9	34	c12n15, c05f11, c12n9, c05g3, c05f17

Cuadro 16: Definición de la tecnología de cada Clusters para Monitoreo y Control de Pozos y Tranques

Cluster	Tamaño	Clasificaciones
1	7	g05d7, g05b15, b05b12, b23k13, g06n99
2	11	a01g27, g05b15, h02j3, g05d7, g05b19
3	30	a01g9, g06q50, g06q10, a01g31, g06q30

Cuadro 16: Definición de la tecnología de cada Clusters para Monitoreo y Control de Pozos y Tranques *(continued)*

Cluster	Tamaño	Clasificaciones
4	26	g05d7, a01g25, g05b15, g05b19, a01g29, f16k17, g05b11
5	2	a01g25, g05d7, g05b15, g05b19, h04l29
6	6	a01j7, c05g3, a01j5, c05f11, e21b43
7	71	c02f9, b01d61, b01d21, c07c29, c02f11
8	1	c12n15, a01n25, c12p7, f03b13, c07k14
9	1	c02f10, c02f1, d21c11, d21c3, d21f1, g21f9
10	33	a01k61, a01k63, c12p7, c12m1, c12m3
11	65	a61k31, a61k9, c07j17, a61k47, c07j3, c07j73
12	3	c02f1, c02f10, h01l31, c02f3, f03g6, h02n11
13	12	c02f3, c02f1, b01d21, c02f10, b01d61
14	450	c02f1, b01d21, b01d61, b01d1, b09c1
15	20	a61k38, a61k47, c12p7, c07k14, a01n37
16	97	a61p11, a61p1, a61p37, a61k31, a61k9
17	3	a61k31, c07j1, c07j3, a61k9, c07c53
18	61	a01g25, a01g27, g05b19, a01g17, g05d7
19	14	a61k31, a61k9, a61k47, a61k39, a61p35
20	9	c02f1, b01f3, c01b11, a23l2, c25b11, c25b9
21	24	a01g25, c02f1, a01h3, a62c5, c02f10
22	16	c02f1, c02f10, c02f3, b01d1, b01j2, b01j6, b03c1, b03c5, b22f3, b22f9, b29b17, b63b17, c10g45, c10g57, c22b13, c22b15, c22b21, c22b7, c22b9, f27b17, h01m10, h02k55
23	4	c02f3, a01g33, a01k63, c12n1, b01d36
24	26	g01n33, g01n21, g01n1, g01n27, e21b49
25	43	a61k47, c08g65, a61k9, c07k14, a61k38, a61p31
26	39	a01g25, c09k17, a01g22, c02f3, c02f10
27	67	c02f3, c02f10, e21b43, a01k61, c02f9
28	7	a01g25, a01g17, b05b1, g05d11, b05b12
29	17	g05b23, g05b13, g05b15, g05b19, c02f1
30	51	a61k31, c05f11, c02f1

Cuadro 17: Definición de la tecnología de cada Clusters para Sistemas de Control de Valvulas Inalambricas

Cluster	Tamaño	Clasificaciones
1	8	g05b19, a01g25, g01v9, g06f9, g06q10
2	1	g01j1, g01k7, g01n21, g01n27, g05d27, g08c17, h04w24
3	4	g05b19, h04w4, a01g25, a01g2, h04l29
4	27	g06q, a01b, a01g, g05d1, a01c23, g06k9
5	25	a01g25, a01b79, g05d11, b05b12, a01g1, a01g27, b05b1, b05b13, g06q30, g06t7, g16y10, g16y20, h04l9

Cuadro 18: Definición de la tecnología de cada Clusters para Estaciones Climaticas

Cluster	Tamaño	Clasificaciones
1	4	g01w1, g06q10, g06q50, g01c13, g16h20, g16h40
2	34	g06q10, g06g7, h04l9, g06f19, a01n25, f03d80, g06e1, g06f15, g06f7
3	5	g06f17, g07b17, g07f19, g07f7, g06q40
4	12	g06q50, a01m99, g16y10, a01d91, a01b79
5	7	g01w1, g06q10, c02f1, g01v99, g01n21, h04l12
6	33	g01w1, g01f1, g01r29, g01s13, g01s17
7	4	g01w1, g06f17, h02j13, g06n20, h02j3, h04l29
8	146	g06q10, g06q50, a01f25, a01d91, a01b79
9	7	a01b79, a01b69, a01d41, a01b41, a01b63, a01g2
10	15	g06t7, a01g25, g05d7, g01s11, g06k9
11	11	g06q10, g06q50, a01b79, f03d17, f03d7, g06n20
12	9	a01g, c12m1, f03d11, h02j3, g08g1
13	6	g01s13, g01s17, g01s7, g05d1, b60w40, g01s15, g08g1

Cuadro 19: Definición de la tecnología de cada Clusters para Imágenes Satelitales y Drones

Cluster	Tamaño	Clasificaciones
1	116	g06k9, b60q9, g08g1, h04l29, h04n7
2	51	g06t7, g01g9, g01v8, g08b15, g16b30
3	74	g06k9, g06t7, a01m1, g06n3, a01m99, g01f22, g01n23
4	113	h04n21, a63f13, g06k, g08g1, h04n7
5	117	g06t15, b01l9, g03b15, g05b19, g09g5

6. Análisis IPC 3

La Clasificación Internacional de Patentes, IPC por sus siglas en ingles, es un sistema jerarquico para la clasificación de patentes a partir de las distintas áreas de tecnologías a las que pertenecen.

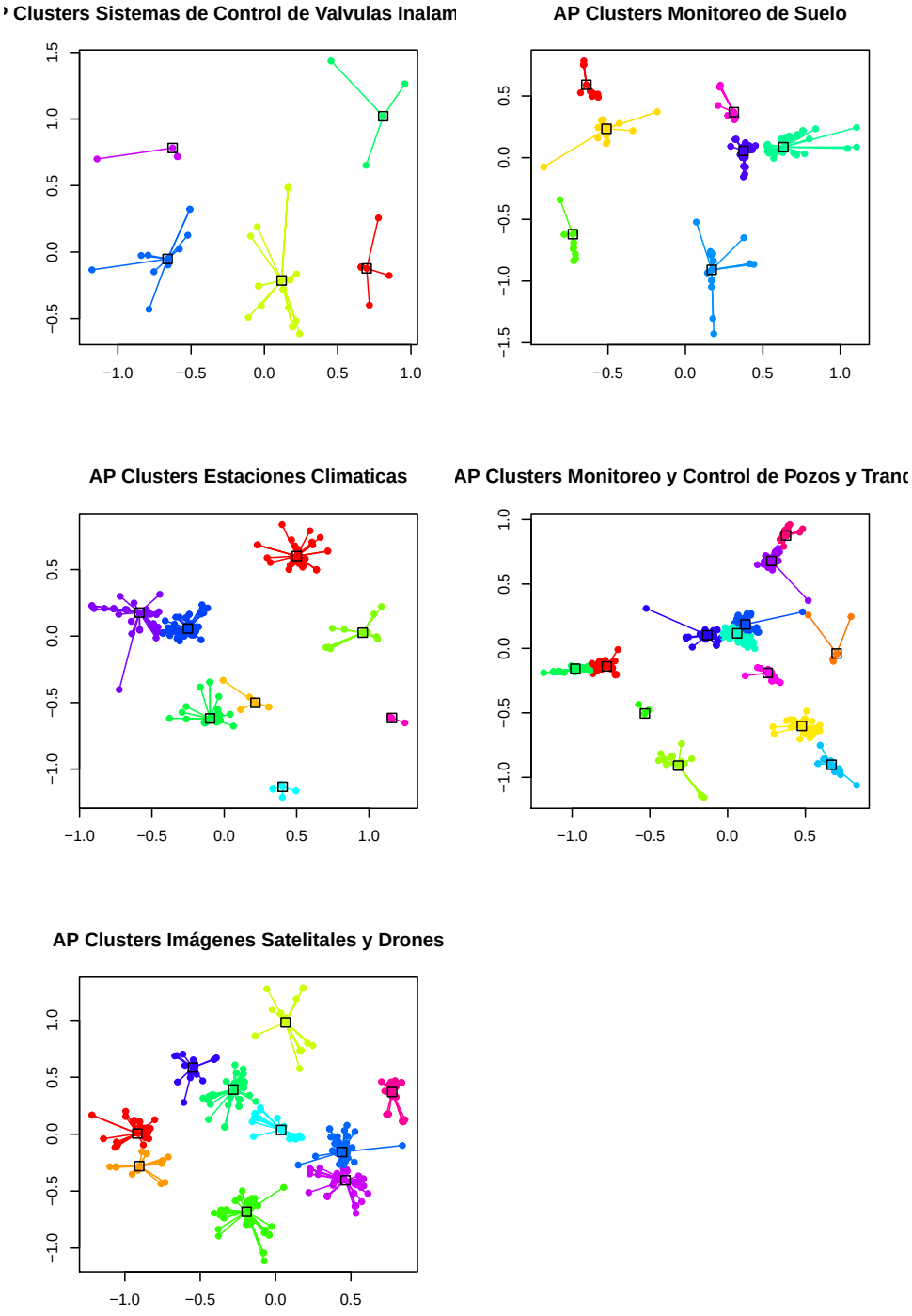


Figura 4: Resultados con AP Clustering

Cuadro 20: Descripción de las bases utilizadas

Temática	# de Clusters	N de patentes	Net Similarity	Input Preference	# de Iteracciones
Monitoreo de Suelo	7	214	-9.42	-0.829	139

Cuadro 21: Definición de la tecnología de cada Clusters para Monitoreo de Suelo

Cluster	Tamaño	Clasificaciones
1	15	g01n, a01c, b60k, b60w, a01b
2	55	g01n, g01d, g08c, b81b, b82b, g01h, g01l, h01l, h04r
3	22	a01g, g01n, e02b, f21s, g01t, h02j
4	42	c12n, c12p, c05f, a01n, a01p
5	23	a01g, c05g, b05b, g05b, h04w
6	41	b09c, b65d, b67d, g01m, g01w
7	16	a01c, g01c, g01s, b01j, b25j, h01j

Cuadro 22: Definición de la tecnología de cada Clusters para Monitoreo y Control de Pozos y Tranques

Cluster	Tamaño	Clasificaciones
1	159	a01g, b05b, a01c, f21v, g06q
2	6	g05b, g05d, h02j, f24h, g06n
3	124	a61k, c07j, c07k, c07d, c08g
4	19	b01d, c01d, c10g, b03b, b60p, c01c, e21c, f25d, h01j
5	4	a61p, a61k, c07j, c08g, c07d, c07k
6	56	c02f, a61k, a61j, f24v, a61p
7	473	c02f, b09c, b01j, c12m, b09b, b63j, c04b, d21c, f23g, h02n
8	52	c02f, a01g, b01d, a62c, c12g
9	112	a01g, b04c, b01d, a47g, b01f, c07c
10	39	a01g, g05b, g05d, h04l, a01b
11	85	e21b, e02b, a01j, c12p, g06q
12	38	c02f, b01d, b01j, b03c, b03d, c10j
13	49	a01n, c07k, c12n, a23b, a01h

Cuadro 23: Definición de la tecnología de cada Clusters para Sistemas de Control de Valvulas Inalambricas

Cluster	Tamaño	Clasificaciones
1	11	a01g, g05b, g01v, g06q, g06f
2	30	a01g, c12m, a01b, b05b, g05d, g06q
3	4	a01g, g05d, g01j, g01k, g05b
4	16	g06f, g08b, a01m, b67d, f04d, f16k, g01b, g01c, g01p, g0b5
5	4	g05d, b64c, h04b, a01b, a01c, g06k

Cuadro 24: Definición de la tecnología de cada Clusters para Estaciones Climaticas

Cluster	Tamaño	Clasificaciones
1	49	g06q, a01b, a01m, a01c, g06k, g06t, b62d
2	20	g06f, g07b, g07f, a01c, g01r, g08g, h02s
3	22	g06q, g06f, g01w, g06g, a01b
4	29	g01w, g01f, g01s, g05d, f03g, h02g
5	10	g01w, g06f, g09b, g08b, e02b
6	107	a01k, a01m, c12m, h01l, g01s
7	50	g05d, a01g, g05b, g01s, g05f, h02m
8	6	g06q, g01w, g06f, c02f, h04l

Cuadro 25: Definición de la tecnología de cada Clusters para Imágenes Satelitales y Drones

Cluster	Tamaño	Clasificaciones
1	55	g06k, g06t, g01j, a01m, g06n
2	20	h04n, a63f, g01d, a63b, a45b, f16m, g07b, g11b, h04h
3	23	g06k, g01f, g06t, g01v, g06n
4	64	g06k, h04n, g10l, g01p, g08c
5	72	g06t, g01v, g16b, g09g, g06n
6	21	g06k, b61b, g05b, g06n, b61l, g10h
7	71	g06k, g01p, g06t, h04n, a63b
8	19	g01j, g05b, b01l, a01d, g01b
9	65	g06k, a01m, g06t, h04n, a01h, f42c
10	61	g06f, h04m, g06q, g10l, e02f, g06g, g07d, h04r