The Mathematical Background of Proving an Inventive Concepts Based Claimed Invention Satisfies SPL

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Mathematics for ET CIs I

- Mathematical modeling is the basis for
- abstract descriptions and solutions of practical problems like
  - the motion of a fluid,
  - the stability of a construction,
  - the dynamics of a population, gambling strategies,
  - the prediction of monster waves etc.
- Using mathematical structures and procedures like
  - axioms, sets, maps, numbers,
  - differential equations, optimization techniques,
  - probabilities etc.

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Mathematics for ET CIs II

◆Mathematics for ET CIs (or more general innovation) offers a framework to support a precise decision on the **patent eligibility and patentability** of such a claimed invention.

◆ It has to be in accordance with **Substantial Patent Law**, which is given in our case

- ◆by 35 USC § § 101/102/103/112
- ◆and its interpretations in the KSR/Bilski/Mayo/Myriad/Biosig/Alice cases

◆Basic entities for describing claimed inventions should be **inventive concepts** (US Supreme Court's Mayo decision). Their formal definition will be given below.

The FSTP-tests

- The above mentioned sections from USC 35 and the conclusions from their interpretations mentioned on the previous slide lead to a comprehensive system of 10 well-distinguishable disaggregated requirements to be checked by the FSTP-test.

- Mathematically speaking these requirements represent the axioms for an ET CI to be patent eligible and patentable:

- An ET CI is **patent eligible and patentable**, if and only if it passes the **FSTP-test**.

Knowledge representations

- The tests themselves have been addressed by the previous speaker and will be presented in full detail in the next talk.
- But it is obvious that the representation of the CI given by the original text of the application is not suitable to decide on the validity of the tests.
- The knowledge described by the original document has to be transformed into more suitable representations, which also allow for identifying the inventive concepts.

Concepts and their mirrors

- The mathematical structure describing a concept is given by a domain set D, a set of value sets V and a relation between these sets U, which in our case is a map from D to V.
- More precisely, we only need **binary concepts** where the V has two points, which may be given by “true” and “false”.
- Equivalently a binary concept is given by a disjoint partition of the domain into a **truth set** and a false set, where the truth set is the relevant part for carrying out the tests.
- There is a mirror-like relation between binary concepts and FFOL-predicates, used to change from set theoretical considerations of logical ones and vice versa.

The KRT 1

- The level of the original: Here the usual mark-up will take place leading to the MUIs
- The compound level BAD: The elements and their properties will be identified departing from corresponding clusters of MUIs, they are formulated as compound predicates and mirrored by a binary compound (aggregated) concept
- The elementary level BID: The aggregated concepts are disaggregated into elementary concepts, which cannot be disaggregated in a reasonable way anymore.
- A person of ordinary skill and creativity (posc) has to be involved for this.

The KRT 2

- BAD and BED are connected by a transformation (more explicitly a bijective transformation of subset coverings of the corresponding unions of domains).
- This enables the user to go back from the domains of the BEDs to the MUIs, i.e. it it possible to see where the BEDs are disclosed in the original document.
- In terms of mirror predicates the conjunction of all BED mirrors has to be logically the same as the conjunction of all BAD-mirrors.
- The BED-concepts are suitable to decide if they pass the FSTP test. But taking all of them mostly will not be successful.

Generating sets

- Taking a subset from the BEDs this still may have dependencies, gaps and other problems making it impossible to pass the tests.
- The gaps are avoided by the so-called generative sets of concepts, which exist in the well-posed case. These are subject to the 10 tests, and if they pass all of them, they will be the creative basis for a set of BIDs, binary inventive concepts.
- These BIDs are still missing their legal parts, which will be added by a relation to the legal requirements satisfied by them as a single concept or as the part of a concept set.
- Again these procedures need the participation of a posc.

Further formalizations

- Independency: one test refers to the independency of the BIDs. Roughly said, this means that none of the concepts can be removed if you still want to solve the given problem. This is expressed in terms of conjunctions of the mirror predicates.

- Non-preemptiveness: This requires to define the scope of an ET CI. The solution is given in terms of products of truth sets for generative sets for the CI. It also requires the description of the problem to be solved.

- Semantic and innovative heights: Here prior art and pertinent skill enter the screen. For distinguishing the innovative ideas of the CI from what had been developed by the inventions in prior art and what is considered as pertinent skill, the so called ANC-matrix is set up, providing a system of entries where this information can be taken from. This is part of the description of the tests.

Thanks

Thank you for your attention

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